Appendix - I

Course Structure for M. Sc. Electronics to be effective from the Academic Session 2003

Semester- I

S. No.	**Course No.**	**Course Name**	**Marks Written Examination**	**Continuous Assessment**
i	ELE-S1:01	Engineering Mathematics	80	20
ii	ELE-S1:02	Circuit Analysis and Synthesis	80	20
iii	ELE-S1:03	Analog Electronics	80	20
iv	ELE-S1:04	Numerical Techniques And Object Oriented Programming	80	20
v	ELE-S1:05	Analog Communication	80	20
vi	ELE-S1:06	Laboratory –I	80	20
vii	ELE-S1:07	Laboratory –II	80	20
		Total	560	140
		Grand Total	**700**	

Semester-II

S. No.	Course No.	Course Name	Marks Written Examination	Continuous Assessment
i	ELE-S1:01	Engineering Mathematics	80	20
ii	ELE-S1:02	Circuit Analysis and Synthesis	80	20
iii	ELE-S1:03	Analog Electronics	80	20
iv	ELE-S1:04	Numerical Techniques And Object Oriented Programming	80	20
v	ELE-S1:05	Analog Communication	80	20
vi	ELE-S1:06	Laboratory –I	80	20
vii	ELE-S1:07	Laboratory –II	80	20
		Total	560	140
		Grand Total	**700**	

Semester – III

S. No.	Course No.	Course Name	Marks Written Examination	Continuous Assessment
i	ELE-S3:01	Digital Signal Processing	80	20
ii	ELE-S3:02	Control system Engineering	80	20
iii	ELE-S3:03	Computer Architecture and Organization	80	20
iv	ELE-S3:04	Physics of Semiconductor Devices	80	20
v	ELE-S3:05	Fuzzy Logic and Neural Networks	80	20
vi	ELE-S3:06	Laboratory –I	80	20
vii	ELE-S3:07	Laboratory –II	80	20
		Total	560	140
Grand Total			**700**	

Semester - IV

S. No.	Course No.	Course Name	Marks Written Examination	Continuous Assessment
i	ELE-S4:01	Digital Communication and Information Theory	80	20
ii	ELE-S4:02	Electronic Instrumentation	80	20
iii	ELE-S4:03	VLSI Technology	80	20
iv	ELE-S4:04	(A) Project Work * (B) Seminar**	200 50	70 00
v	ELE-S4:05	Industrial Training***	80	00
Total			570	130
Grand Total			**700**	

**The dissertation pertaining to the project work shall be jointly evaluated by the external examiner to be appointed by the University and the project supervisor -- a staff member.*

*** All the students are required to deliver a seminar on the assigned project covering its different aspects, theory as well as practical.*

**** The students are required to undergo training at some center of excellence outside the state to get additional exposure in the new and emerging trends in the discipline of Electronics. This component shall be evaluated by the host Institute through conduct of theory and practical examinations in collaboration with the teacher in-charge of the Department.*

Semester- I

Course No. ELE-S1:01 Marks: 80

Engineering Mathematics.

Unit I: Fourier Transform (10 Lectures)

Dirichlet's Condition , Determination of Fourier Coefficients, Fourier Series for arbitrary period, Half-wave expansion, Fourier Integral Theorem, Fourier Sine and Cosine integrals, Fourier Transforms, Properties of Fourier Transforms, Fourier Transform and Dirac delta function, Image processing by Fourier Transform, Improvement of Signal to noise ratio by Fourier Transformation.

Unit II: Laplace Transformation (10 Lectures)

Integral transforms, Laplace transforms, Simple properties of Laplace transforms, First and second shifting theorem, Deviates of Laplace Transform, Laplace transforms of integrals, Integration of laplace Transform, Inverse of Laplace transform by partial fractions , Laplace transform of solving second order differential equation, Simple applications of Laplace transform in Electronics.

Unit III: Function of complex Variable (10 Lectures)

Analyticity of Complex variables, Cauchy Riemenn Conditions, Cauchy integral Theorem, Laurent's Series, Singularities, Poles, Residue, Residue Theorem Contour integration for Trigonometric functions(0 to 2 π) , Contour Integration for functions (-∞ to + ∞)

Unit IV: Special Function (10 Lectures)

Power Series solution to differential equations, Power Series solution to Bessel Legendre and Hermit's differential equations, Bessel function, Legndre Polynomial, Hermite Polynomial, Recurrence relations for Legendre, Bessel and Hermite Polynomials.

References

01. Applied Mathematics for Engineers and Physicist by Pipes and Harvill, McGraw Hill Book Company.

02. Advanced Engineering mathematics by Edwin Kreyzing, Wiley eastern Ltd.

03. Numerical Methods for Engineers and Scientists by A.C. Bajpai, I. M. Calus and J. A. Fairley, John Wiley & Sons

03. *Numerical Methods for Scientific and Engineering Computation By M. K. Jain, S. R. K. Iyengar, R. K. Jain. New Age International Publisher.*

04 Statistical Methods by S. P. Gupta, Sultan Chand and Sons Publisher.

05. Numerical Methods for Engineers by Steven C. Chapra and Raymond P. Canale, TMH

Course No. ELE-S1:02 Marks: 80

Circuit Analysis and Synthesis

Unit I: Graph theory and Network Equation (10 Lectures)

Definition of Node, Branch, Graph, Sub- Graph, Tree, Link and Twig, Network Matrices, Incidence Matrix, Loop Matrix, fundamental Loop, Cut set Matrix, Fundamental Cut Set, Relationship between Matrices, Formulation of Network Equations on the Loop and Node pair voltage bases, Fundamental Loop Mesh Equations, Nodal equations, Nodal Admittance, Source Transformations, Tellegen's Theorem and its Applications

Unit II Two Port parameters (10 Lectures)

Various Two Port parameters, O. C. Impedance and S. C. Admittance Parameters, h-parameters, chain Parameters, Image Impedance, Applications of various Two port Parameters to T and π networks, Relation ship between different two port parameters, Interconnection of Two port equivalent networks, Indefinite Admittance Matrix .

Unit III: Network functions , Circuit Responses and State variable Approach

(10 Lectures)

Natural frequencies, Complex frequencies, system function of Network, Driving point and Transfer functions, Poles and Zeros of a network function, Poles, Zeros and Impulse response, Poles, Zeros and Frequency response, Physical interpretation of Poles and Zeros, Oscillatory response of Poles and Zeros., Basic consideration in writing state variable equations for electrical Network, Order of Complexity, Formulation of state equations for Electrical Networks and their solutions.

Unit IV: Passive Network Synthesis (10 Lectures)

Introduction, Positive Real Function (PRF),, Basic Synthesis Procedure, LC Immittance Functions, Foster Form-I and II, First Cauer Form, II-Cauer Form, RC Impedance Function, RL impedance or RC Admittance Functions, Cauer Forms or RL Impedance and RC Admittance.

References:

1. *Networks and Systems by D.R.Choudury, Wiley Eastern Ltd: New Delhi.*

2 *Circuit Analysis with computer Application to problem solving by Gupta Bayless and Piekari, Willey Eastern Ltd, New Delhi*

3. *Network Analysis theory and compute methods by donson and Watkins, Prentice Hall, New Delhi.*

4. *Circuit, Theory Fundamentals and Applications by Aram Budak,Frentice Hall,*

Inc: Englewood Cliffs

4. *Network Analysis By M. E. Valkenburg, Prientence Hall India. basic Circuit Theory By charles A. Desoer and Ernest s. Kun, McGraw H*
5. *Network Analysis and Synthesis, CL Wadhwa, New Age International Publishers.*

ELE-S1:03 Marks: 80

Analog Electronics

Unit 1: Operational Amplifier characteristics (10 Lectures)

Differential Amplifier, Emitter coupled differential Amplifier, Transfer characteristics of differential Amplifier, Current Mirrors, Active Loads, Non- ideal parameters of OP- AMPs, Frequency response of OP- Amps, Compensation, Pole – Zero compensation, Dominant pole compensation, Lead compensation, A. C. coupled amplifier , Analog integration and Differentiation

Unit II: Operational Amplifier Systems (10 Lectures)

Electronic analog computation, Active filters, Active resonant bandpass filter, Precision ac/dc converters, Sample and hold systems, Analog multiplexer, Logarithmic and Exponential amplifiers, Digital to analogy converters (DCA), Analog to digital converters (DCA).

Unit III: Wave shaping and Wave generators (10 Lectures)

Comparators, Applications of comparators, Regenerative comparators (Schmitt-trigger) , Square wave and triangular wave generators, pulse generators, voltage time-base generators, Step(Stair-case) generators, Modulation of square wave, sinusoidal generators, Phase shift oscillator General form of oscillator configuration, Wein-bridge oscillator, Crystal oscillator.

Unit IV: Phase Locked Loop and Miscellaneous Circuits (10 Lectures)

Phase locked loop, Basic building block, Operation of loop components, Locking of PLL, Lock-in range, Pull-in range, PLL as AM detector, FM detector, Frequency Synthesizer, , FM demodulator, FKS, Demodulator, PLL motor speed control, SE/NE 656,General Tranlinear Principle, Various Translinear circuits, Squarer/divider, Squarer rooting, Vector, magnitude circuit, Trans-linear current amplifier, current conveyor and its Applications, Norton OP-Amp and its applications, LM3900

References:

1. *Microelectronics By Milliman and Grabel, McGraw Hill Company*
2. *Electronics Circuits Discrete and Integrated by Schilling and Belove,, McGraw Hill Book Company.*
3. *Phase Locked Techiniques by Gardner, Wiley Eastern India Ltd.*
4. *Intgreated Electronics By Milliman and Halkias, McGraw hill Book company*
5. *Integreated Circuit Engineering by Glaser and Suibak Shape, Addision Wiseley Publishing company, London*
6. *Operational Amplifiers and Linear Iontegreated Circuits by Robert F. Coughlin and Frederick F. Drisiol, Gayakward, Prientence Hall of India Private Ltd.*
7. *OP- Amp and Linear Integreated Circuits by R. A. Gayakward Prientence Hall of India Ltd.*
8. *Phase Locked loops – Theory, Design and Applications By R. E. Best, McGraw Hill Book Company.*

ELE-S1:04

Marks: 80

Numerical Techniques and Object Oriented Programming

Unit: I Algebraic and Transcendental Equations (10 Lectures)

Bisection Method, Iteration Method and its Convergence, Method of False Position, Chord Method, Newton –Raphson Method, Discussion of Convergence,

Interpolation: Linear Interpolation, Difference tables, Newton- Gregory Forward and Backward Difference Formulae, Newton's Formula for Unequal Intervals, Guass's Central Difference Formula, Stirling's Formula, Langrange's Interpolation.

Unit: II Linear Equations and Ordinary differential Equations (10 Lectures)

Guass Elimination method, Pivotal Condensation, Guass- Sideal Iterative Method, Eigen values and Eigen Vectors.Taylor series and Euler Methods, Local and Global Error Analysis, Runge-Kutta Method, Predictor– Corrector Method, Differentiation and Integration: Differentiating Formula based on Polynomial Fit, Pitfalls in Differentiation, Trapezoidal Rule, Simpson's Rules, Guassian and Qudrature, Newton Cotes integration formulae.

References:

01. Fortran 77 and Numerical Methods by C. Xevier , New Age International Publisher
02. Numerical Mathematical Analysis by James B. Scarbourugh Oxford and IBH Publication.

03. Introductory Methods of Numerical Analysis by S. S. Sastry PHI.

01. Numerical Methods for Scientific and Engineering Computation By M. K. Jain, S. R. K. Iyengar, R. K. Jain. New Age International Publisher.
05. Statistical Methods by S. P. Gupta, Sultan Chand and Sons Publisher.

06. Numerical Methods for Engineers by Steven C. Chapra and Raymond P. Canale, TMH

Unit III: Introduction to C++ (10 Lectures)

Basic Concepts of Object Oriented Programming, Basic Programme construction, , Compilation, Tokens and identifiers, Variables and Constants, Data Types, Operators, Control Statements,

Functions: Declaration of Functions, Calling Functions, Passing different arguments and returning values, Overloaded functions, Inline functions, Default arguments, Returning by reference,

Unit IV :Classes and Objects (10 Lectures)

Class, Objects, Concept of Inheritance and encapsulation, Operator Overloading, Dynamic binding, Overview of OOP using C++, Objects as functions arguments, array of Objects, Returning objects from functions, Structures and classes, Constructors and Destructors, Parameterized constructors, Constructors with default arguments, Dynamic Initialization of Objects, Dynamic Constructors,, Operator Overloading, Overloading of Binary operators, Data and Type conversions, Derived Classes and Inheritance, Derived class constructors, Overriding the member functions, Inheritance, Multiple Inheritance, Pointers, Pointers and Arrays, Pointers, and strings, Memory management using new and delete operators, Virtual functions, Streams, Templates, Exception Handling

References:

1. Teach yourself C++, Alstevens, Mis, press, Inc,USA-1995.
2. A comprehensive guide to C++, Vishwagit Aklecha BPB publications New Delhi.
3. Object oriented programme with C++, David parsson BPB publication New Delhi.
4. Programming with C++, Puppas and Murray Published by WAITE.
5. C++ Components and Algorithms, Lado BPB Publications.

E**LE-S1: 05** **Marks: 80**

Analog Communication

Unit I: Amplitude and Frequency modulation (10 Lectures)

Review of Amplitude modulation and de-modulation, Generation and detection of DSBSC, SSBSC and VSB signals, Frequency modulation, Single tone FM, Mathematical analysis of Single-tone Narrow-band FM (NBFM) and Broad-band FM (BBFM), Frequency deviation and Modulation index, Generation and detection of NBFM and BBFM, Band-width of AM and FM systems.

Unit II: Noise in AM and FM Systems (10 Lectures)

Noise in Communication System, Thermal Noise, Time-domain representation of Narrow band Noise, Filtered White Noise, Noise equivalent Band-width, Effective Noise temperature, Noise figure,
AM Receiver model, Noise analysis of DSBSC and SSBSC using coherent detection, Noise in AM using Envelope detection, Noise in FM using Limiter-discriminator detection, FM threshold effect, Pre- emphasis and De-emphasis in FM, Comparison of band- width requirements, noise figure and circuit economy of various analog modulation techniques.

Unit III: Monochrome TV (10 Lectures)

Video and audio transmission, Linear and Interlaced scanning, Flicker, Horizontal and Vertical resolution, Video bandwidth, Components of Composite Video Signal *(Front Porch, Back Porch, SYNC and Blanking signals)*, Types of TV camera tubes *(introduction only),* Solid- state image scanners, TV recording *(Kinescope recording, Electronic video recording, Magnetic video tape recording and Video disc recording)*, Propagation of TV signals: Radio-wave characteristics, Propagation phenomenon, Space-wave Propagation, Line-of-sight Propagation; Distant reception, Shadow zones, Co-channel interference and Ghost images; Introduction to TV via satellite,

Unit IV: Color TV and TV-antenna Design (10 Lectures)

Color fundamentals, Mixing of colors, Brightness, Hue and Saturation, Color circle, Color TV camera and picture tubes, Color TV transmission and reception, I and Q signals, NTSC system and PAL system for color TV transmission and reception.

TV Reception, Antennas for TV Reception, Receiver antenna design *(Yagi antenna),*

References:

01. Communication Systems by S. Haykin, Wiley Eastern Ltd. 3rd edition
02. Communication Systems by B. P. Lathi, Wiley Eastern Ltd.
03. Communication Systems by George Kennedy, McGraw Hill Book Co.
04. Principles of Communication Systems by Taub and Schilling TMC Publishing Co.
05. Television Engineering by R. R. Gulati, Wiley Eastern Co.
06. Introduction to Television by Grobe, Wiley Eastern Ltd.

Semester- II

ELE-S2:01 Marks:80

Opto Electronics

Unit I : Lasers (10 Lectures)

Spontaneous and Stimulated emission, Population inversion, Einstein probability coefficients, Laser action, Types of optical resonators, Q- switching, Cavity damping and, Properties of laser radiation, Ruby laser and Semiconductor lasers, Laser applications.

Unit II: Optical Fiber Communication (10 Lectures)

Optical Fiber *(O. F.)* wave guides, Step-index and Gradient index Fibers, Ray theory transmission through an O. F., Acceptance angle and numerical aperture, O. F. modes, O. F. characteristics *(attenuation, absorption, scattering and dispersion)*, Fiber joints, Couplers and Connectors, Optical sources *(Lasers and LEDS)*, Optical detectors *(PN and PIN diodes). Photo-Transistor,* Fibre Optic Communication System -- coupling to and from the fibre , Modulation, Multiplexing and Coding, Repeaters, Band-width, and Rise-time budgets

Unit III: Electromagnetic Waves (10 Lectures)

Maxwell's Equations and applications, Time varying fields, Wave equation, Plane Wave Propagation, reflection and reflection co-efficient, Poynting vector, Transmission lines, Characteristic of impedance matching, Smith Chart.

Unit IV: Microwave Devices **(10 Lectures)**

Microwave components, (T, Magic-T, Tuner, Circulator, Isolator, Directional Coupler), , Microwave tubes (Klystron, reflex Klystron, Principle of Magnetron), Microwave semiconductor devices(Basic Theory of Gun, GaAs FET, Crystal detector and PIN diode), Concept of Wave-guides *(rectangular wave guide (TE,TM and TEM mode of propagation), Cylindrical, Wave guide and spherical cavities, Cavity Resonators,*

References:

01. Engineering Electromagnetic Fields and Waves by Carl I. A., John Wiley & Sons.
02. Lasers, Theory and Applications by Thyagari and Ghatak, Macmillian India Ltd.
03. Lasers and Non- Linear Optics by B. B. Laud, Wiley Eastern Ltd. New Delhi.
04. Microwave devices and circuits by samuel.Y.Liao.
05. Microwave and radar engineering by M.Kulkarni.

ELE-S2:02 Marks: 80

Active Filters: Theory and Design

Unit-I Active Elements and Their Applications (10 Lectures)

Introduction to Active elements, primary and secondary building blocks, operational amplifier, operational transconductance, amplifier (OTA), immitance converters and inverters, generalized immitance converter, pathological elements, (Nullator, Notrato, and Nuller) and their use in realizing controlled sources and other active elements,

Unit-II Active Filter Design (10 Lectures)

Active filter synthesis, cascade approach, first order networks, simulated inductance approach and FDNR, approach, to op-amp RC filters, the BIQUAD (Single amplifier and multi-amplifier biquads) filters, negative feedback topology, positive feedback topology, some design problems, introduction to active-R filters.

Unit- III Filter Approximation Models (10 Lectures)

Introduction to Analog filter theory, filter approximations, Butterworth approximation, Chebyshev approximation and inverse Chebyshev approximation, frequency transformations, low pass-lowpass, low pass-highpass, lowpass-bandpass and low pass to band reject transformations.,, some design problems

Unit- IV Sensitivity Function and Switched Capacitor Filters (10 Lectures)

Sensitivity study, Sensitivity function, magnitude and pass sensitivities, single parameter sensitivity, multiple parameter sensitivity, gain sensitivity, root sensitivity, general relation of network function sensitivities.

The MOS switch, The Switched capacitor/resistor equivalence, analysis of swtched capacitor filter using charge conservation equations, switched capacitor biquads, design example

Use SPICE and Micro-Sim in Analysis and of Filters.

Reference:

1. Passive and Active Filter Theory and Implementation, Wai Kai Chen,, John Wiley and Sons, 1986
2. Analog Filter Design, M. E. van Valkenburg, Holt Rinehart and Winston, New York, 1982
3. Analog and Digital Filters: Design and Relization, Y. F. Lam, Englewood N. J. 1979.
4. Principles of Active Network Synthesis and Design, Gobind Daryani, John Wiley, New York

ELE-S2: 03 Marks : 80

Microprocessors and Micro-controller

Unit I: Introduction to Microprocessors and Micro-Computers (10 Lectures)

Evolution of microprocessors and Micro-Computers, Generations of Computers, Introduction to Microprocessor based Computer Systems, Data Representation, Applications of Microprocessors, Concept of BUS, Types of Buses (Dedicated, Multiplexed, Synchronous, Asynchronous), Tri-state devices, Buffers, Latches.

Introduction to 8086 Microprocessor, Pin-out diagram of 8086 Microprocessor, Architecture of 8086 Microprocessor, Functions of BIU, EU, Working of 8086 Microprocessor, Various Registers of 8086 Microprocessor and their purpose,

Memory Addressing Modes, Concept of Segmentation, Effective and Physical Address, Various Address Modes of 8086

Unit II: Assembly Language Programming (10 Lectures)

Introduction to Programming, Various level of Programming, Instruction set of 8086 Microprocessor, Data transfer instructions, Arithmetical and Logical instructions, Branch Instructions, Processor control instruction, String operation instructions.

Assembly language Programming, use of Procedures and Macros in ALP, input/output using Interrupts, Use of various types of sequence control instructions,

Unit III: Interrupts (10 Lectures)

Introduction to interrupts and Interrupt service subroutines, Interrupt Vector table, various types of Interrupts, Software Interrupts, Hardware Interrupts, Multiple Interrupts, Input /Output structure, Device Access, Operating Systems Calls, BIOS Calls and Direct Device Access,

Hardware Specifications of 8086 Microprocessor, Pin-out diagrams and Function of each pin, Various Types of 8086 microprocessor, Architecture and operation of 8284A Clock Generator, Buffering and Latching of 8086 Microprocessor, Bus timings, Timing Diagrams, Wait States, Minimum Mode 8086 System, 8288 Bus Controller, Maximum Mode 8086 System, Peripheral Devices and Interfacing, Memory interfacing, Memory mapped and I/O Mapped Schemes, Introduction to memory and its types,, Memory Interfacing, Memory Device specifications, Use of Decoders, Even and Odd Addressing

I/O Interfacing, Isolated and Memory mapped I/O Instructions, Data Transfer Schemes, I/O map, Ports, 8255 Programmable Interrupt Controller, 8257 Programmable DMA controller, 8254 Programmable Interval timer, 8259 Programmable interrupt Controller, 16550 Programmable Communication Interface, , DAC0830 Digital to Analog Converter, ADC0804 Analog to Digital Converter.

Unit -IV Advanced Microprocessors and Introduction Micro-controllers

(10 Lectures)

Introduction to 80286, 80386, 80486 and Pentium Processors, Difference between CISC and RISC processors, Various emerging trends in Microprocessor Design, Co-processors and I/O processors, Overview of 8087 co-processor.

Micro-controller Survey, The 8051 architecture : Introduction, 8051 micro-controller Hardware (Oscillator and Clock, PC and Data pointer, CPU registers, flags and PSW, Internal memory, Internal Ram, Stack and SP, SFR's Internal ROM), Input/output pins, Ports and Circuits, external memory, Counters and Timers, modes of operation, Serial data input/output, Interrupts.

References:

01. Introduction to 808, 80186,80286, 80386, 80486, Pentium and Pentium Pro Processors, B. Bray, Tata McGraw Hill Publishing Company
02. Microprocessor and x86 Programming, V. R. Vengopal, McGraw Hill Publishing Company
03. Microprocessor Theory and Applications, M. Rafiq-u Zaman, McGraw Hill Publishing Company
04. Intel Microprocessors, Hardware/Software
05. Digital systems from Gates to Microprocessors by S.K.Bose, Wiley Eastern Ltd.
06. Digital Logic and Computer Design By Morris Mano, Prentice Hall of India Ltd.
07. Microprocessor Architecture, Programming and Applications by Ramesh S. Goankar, Wiley Eastern Ltd. New Delhi.

08. Microprocessors and Interfacing, Programming and Hardware by D. Hall, Tata McGraw Hill.
09. Microprocessor and Microcomputer based system Design by Rafique Zaman, Universal Book Stall.
10. Microprogramming and Computer Architecture by K.L. Short, Prentice Hall of India Pvt. Ltd.
11. Microprocessor, Avtar Singh, Prentice Hall of India Ltd.

Course No. ELE- S2: 04 Marks: 80

Power Electronics

Unit I: Power Devices (10 Lectures)

Review of switching characteristics of semiconductor devices *(Power diodes, BJT's,),* Thyristor characteristics, Methods of turning ON, turnoff mechanism, di/dt protection, dv/dt protection, Gate triggering circuits, Device specifications and ratings, DIAC, TRIAC and UJT V-I characteristics, Base drive for BJT's. ,

Unit II: Thyristors Circuits and Applications (10 Lectures)

Series and Parallel combination of SCR, AC voltage controllers, Principle of ON- OFF control, Principle of phase control, Single phase bi-directional controllers with resistive loads, Commutation techniques, Snubber circuits

Unit III: Switch Mode DC to DC Power Converters (10 Lectures)

Design of BUCK converters, BOOST converters, BUCK – BOOST converters, Forward converter, Fly back converter, Half-Bridge converter, Push Pull converter and Full Bridge converter.

Unit IV: Applications of Control Rectifiers and Inverter Design (10 Lectures)

Pulse width modulation techniques, Unipolar and Bipolar switching circuits, Design of inverters, Single-phase half bridge inverter, Single phase full bridge converter, Single phase push pull inverter, Heat sinks, Single-phase Cyclo-converters , Single-phase dual converters, Speed control of D.C motors.

References:

01. Power Electronics by P. C. Sen, Tata McGraw Hill, Pub. Co.
02. Introduction to Thyristors and their Applications, by M. Ramamorty .
03. Power Electronics, Circuits, Devices and Applications by M. H. Rashid, PHI.
04. Power Electronics by Mohan, Undeland, Robbins, John Wiley and Sons.
05. Industrial Electronics and Control by S. K. Bhatchayrya and S. Chatterjee TTTI, Chandigarh, Tata McGraw Hill, Pub. Co.
06. Power Electronics by MD Singh and K. B. Khanchandani, Tata McGraw Hill, Pub. Co

Note for Examiner:

Eight questions to be set, two from each Unit

Note for Examinee:

Four questions to be attempted selecting one question from each Section

Time Allowed: Three Hours

ELE-S2:05 Marks: 80

Computer Networks

Unit I: Types of Networks (10 Lectures)

Local Area Networks, Medium Area Networks, Wide Area Networks, Value Added Networks, High speed Networks, Public Switched Networks, Resources Sharing, Productivity, Communications Management, ISDN, User Network Interface, Standards, Network Services: E-mail, Database Access, Hybrid Network, Inter-networking, Internet, Web page Design, HTML, Network Protocols, ALOHA and Slotted ALOHA.

Unit II: Network Topologies and OSI Model (10 Lectures)

Network Topologies *(Bus Topology, Star Topology, Ring Topology, Tree Topology)*, Data Communication Codes, Data Communication Modes *(Simplex, Half Duplex and Full Duplex)*, Communication Hardware: Work Station, File Server, Modem Server, Print Server, Bridges, Gateways, Routers, Network Interface Unit, Modems *(Synchronous Asynchronous)*, Front End Processor, LAN cable. Open System Interconnection (OSI) model of a Network

Unit III: Data Communications over Networks (10 Lectures)

Wired Transmission, Public Switched Telephone Lines, Coaxial cables, Optical Fiber Transmission, Microwave transmission, Radio Transmission, satellite Transmission, Signaling Techniques, Synchronous and Asynchronous Transmission,

Error Detection and Correction Techniques, Network access modes *(CSMA and Token passing),* Protocols, Data Transparency, Circuit Switching, Message Switching, Packet Switching, and Throughput Analysis.

Unit IV: Networking Operating Systems (10 Lectures)

Sharing data, File and Record Locking, Disk Space Allocation, Sharing the Printer.

Topology, NetWare and the Concept of a File Server, Techniques for Speeding Up the File Server, File Management under NetWare, Setting up Directories Under NetWare
Mapping NetWare Drives, Search Drive Save Time, System Security, The Login procedure. Introduction to UNIX Operating System , Networking using Windows NT/2000, Introduction to other Network Operating Systems

References

01. Data communication by Larry Hughes, Narosa Publidhing House.

02. Computer Networks by Tanenbaum , PHI.

03. Computer Communications By Chou, W PHI.

04. Telecommunication Switching Systems and Networks by T. Viswanthan, PHI

01. Advanced Unix By Steven Prata, BPB Publications.

Semester III

ELE-S3:01 Marks:80

Digital Signal Processing

Unit -I Discrete Time Signals and Systems (10 Lectures)

Review of Fourier Series and Fourier Transform, Sampled data and discrete time convolution, Z-transform, discrete time signal and their realisation, Transfer function and stability , stead-state frequency response of discrete-time signals.

Unit -II Discrete Fourier Transform Transform (DFT) (10 Lectures)

Introduction, Properties of DFT, functional operations with DFT, Convolution and correlation, Fast Fourier Transform(FFT), FFT algorithms,: Decimation in time and Decimation in frequency algorithms.

Unit -III Finite Impulse Response (IIR) Digital Filter Design (10 Lectures)

Introduction to IIR filters, Design of IIR filters, Bilinera transformation, Impulse invariance and step invariance methods,, digital filter transformation, Design examples.

Unit- IV Finite Word length Effects in Digital Filters (10 Lectures)

Introduction, quantization in sampling analog signals, types of quantization in digital filters, finite register length effects, in relization of IIR and FIR filters.

Use of DSP chip TMS 320-C, DSP Assembly Language Programming. Using Computer with C-DSP Card.

Reference:

1. Theory and Applications of Signal Processing , L. R. Rabiner and B. Gold, Prentice Hall1985
2. Digital Signal Processing, A. V. pOppenheim and R. W. Shafer, Prentice Hall, 1985
3. Introduction to Digital Signal Processing, J. G. Proakis and DG Manolakis, Prentice Hall
4. Introduction to Digital Signal Processing, Roman Kue, Mcgraw Hill Book Co.

ELE-S3:02 Marks: 80

Control System Engineering

Unit I : Control System (10 Lectures)

Control Systems, types of control systems, feedback & its effects, linear & non-linear systems, superposition in linear systems, cascade and feed-forward control, controller tuning, measurement and control of pressure, flow, level, temperature, humidity, speed.

Unit II: System representation and time domain analysis of control systems

(10 Lectures)

Block diagrams, transfer functions, signal flow graphs, time domain performance of loop gain of first and second order control systems, *(steady- state response and transient response*), S- plane root location & the transit response, P-I-D controllers.

Unit III: Frequency Analysis (10 Lectures)

Stability and frequency Domain Analysis ,Stability of linear control systems, effect of feedback as stability and sensitivity, Routh- Herwitz criterion and bode plots, Root-locus plot, Nyquist criterion.

Unit IV: Introduction to modern Control theory (10 Lectures)

State equations, state transition matrix, state transition equations, state diagrams, state space representation from ordinary differential equations, concepts of controllability and observability.

***Reference Books**:*

01. Modern Control Engineering by K-Ogata.
02. Feedback & Control Systems by Disteflno, Stubberud & Williams, Mc graw Hill International
03. Automatic Control systems by B. C. Kuo.
10. Linear Control System Analysis & Design by D. Azzo, Houfil.

ELE-S3:03 Marks: 80

Computer Architecture and Organization

Unit I: Introduction, and Register Transfer Language (10 Lectures)

Evolution of Computers, Stored Programme Concept and Von Neumann Architecture, Review of Digital E electronics, Concept of Bus, Data movement among Registers, A language to represent conditional data transfer, Data movement from/to memory, Arithmetic and logical operations along with register transfer, Timing in register transfer.

Unit II: Architecture of a Simple Processor (10 Lectures)

A Simple computer organization and Instruction Set, Instruction execution in terms of microinstructions, Concepts of interrupt and Simple I/O organization, Implementation of the processor using building blocks.

UNIT III: CPU Organization (10 Lectures)

Addressing Nodes, Instruction formats, CPU organization with large registers, Stacks and Handling of interrupts and subroutines, Instruction pipelining: stages, hazards and methods to remove hazards, Microprogrammed Control Unit

Basic Organization and Microprogrammed controller, Horizontal and vertical formats, Address sequencer

Unit IV: Arithmetic Algorithms and Memory Devices (10 Lectures)

Addition and subtraction for sign magnitude and 2's complement numbers, Integer multiplication using shift and add, Booth's algorithm, Integer division, Integer division, Floating point representations and arithmetic algorithms

I/O Organization: Strobe based and handshake based communication, Vector and priority interrupts, DMA based transfer. Memory device characteristics, Random access memories, Serial access memories, Memory hierarchies, Main memory allocation, Segment and pages, File organization, Cache memories.

References:

01. Computer System Architecture, M. Moris. Mano, Prentice Hall International
02. Computer Architecture and Organization J. P. Hayes, Mcgraw Hill, New York
02. Digital Logic and Computer Design By Morris Mano, Prentice Hall of India Ltd.
03. Microprocessor Architecture, Programming and Applications by Ramesh S. Goankar, Wiley Eastern Ltd. New Delhi.
04. Elements of Computer Organization By Gideon Langholz, John Francioni, AbrahamKandel, PHI.
05. Structured Computer Organization By Tanenbaum, PHI.
06. Computer Design and Architecture By S. G., Shiva, Boston Little Brown.
07. Computer Organization and Architecture By Stallings, PHI.

ELE-S3:04 Marks:80

Physics of Semiconductor Device

Unit I : Crystal Structure and Carrier Transport (10 Lectures)

Crystal Structure, Index system for crystal planes, Crystal planes, crystal defects, Carrier concentration at thermal equilibrium, Carrier transport Equation and phenomenon, Decay of photo excited carriers, carrier lifetime, Hall effect.

Unit II: Semi conductor diodes (10 Lectures)

Abrupt and Graded PN junction, Depletion capacitance, Current- voltage characteristics of PN junction, Diffusion capacitance, Junction breakdown phenomenon, Metal-Semiconductor contact, Energy band diagrams, Schottky effect, Current transport based on thermionic Theory.

Unit III : Bipolar and Field Effect Transistors (10 Lectures)

Bipolar junction transistors, current gain parameters, minority carrier distribution and terminal currents, Ebers- Moll model, Field effect transistors, JFET and MOSFET- Basic device characteristics with analysis, MOS Capacitors, MOSFET Types- Basic device Characteristics with analysis, Equivalent Circuit.

Unit IV: Microwave and Opto Electronic Devices (10 Lectures)

IMPATT: Static and Dynamic Characteristics, Small signal analysis, Transferred Electron Device, Negative differential resistivity, Transferred Electron Model, Modes of operation,Opto-Electronic Devices: P-N Junction Solar Cells, V-I Characteristics, Ideal Conversion efficiency, and spectral response

References:

01. Physics of Semiconductor Devices S. M. Sze, , Wiley eastern Ltd.
02. Electronic Processes in Semiconductors, Azeroff and Brophy, , McGraw Hill Publishing company.
03. Physics and Technology of Semiconductor Devices A. S. Grove, , John Wiley and Sons, New York.
04. Solid State Electronic Devices Ben G. Streetman, , Prentice Hall of India Ltd, N. Delhi.
05. S. M. Sze, VLSI Techonology, Mcgraw Hill Publishing Company.

ELE-S3:04 Marks:80

Fuzzy Logic and Neural Networks

Unit I: Overview of Crisp Sets, Fuzzy Sets and Relations (10 Lectures)

Basic Concepts of Crisp Sets and Fuzzy Sets, Basic Types of Fuzzy Sets, Fuzzy Sets versus Crisp Sets, Representation of Extension Principle for Fuzzy Sets, Operation on Fuzzy Sets, Crisp Versus Fuzzy Relations, Binary Relations on Fuzzy Sets, Equivalence, Compatibility and Ordering Relations, Morphisms and Composition of Relations, Fuzzy Relations Equations, Fuzzy Measures and Possibility Theory, Classical Logic and Multivalued Logics, Fuzzy Propositions and Approximate Reasoning.

Unit II: Introduction to Neural Networks (10 Lectures)

Biological and Artificial Neurones, Preceptors- Classification and Linear Separability X-OR Problem, Hopfield Networks, Overview of Neural Networks Architectures: Mulyilayered Feed forward and Recurrent Networks, Learning: Supervised, Unsupervised and Reinforcement, Generalised Delta Rule

Unit III: Multi-layered Networks (10 Lectures)

Back-propagation (BP) Networks, BP Training Algorithm and Derivation for Adaptation of Weights, Variations in BP and Alternative Cost Functions; improvements in BP Networks, Radical Basis Function (RBF) Networks, Applications of BP and RBF Networks

Unit IV: Recurrent Networks, Unsupervised Learning and Associative Memories

(10 Lectures)

Counter Back-propagation Networks, Boltzman Machine, Unsupervised Learning Methods, Hebbian Learning, Kohonen's Self Organising Feature maps, Adaptive Resonance Theory.

Matrix Associative Memories, Auto Associative Memories, Hetero Associative Memories, Bi-directional Associative Memories, Applications of Associative Memories,Relevance of Integration between Fuzzy Sets and Neural Networks- Pros and Cons, Fuzzy Neurones, Neuro Fuzzy Systems, Fuzzy Associative memories, Application of Fuzzy Sets and Neural Networks in Real World Computing.

References:

1. Fuzzy Sets and Fuzzy Logic: Theory and Applications, G. Klir abd B. Yuan, Printice Hall of India
2. Neural Networks and Fuzzy systems,: A Dynamical System Approach to Machine Intelligence, Printice Hall of India
3. Neura;l Networks in Computer Intellligence, Limin Fu, Mcgraw Hill International
4. Adaptive Recognition and Neural Networks, Yoh-Han Pao, Addison Weseley
5. Introduction to the Theory of Neural Computations, John Hertz, Anders Krogh and Richard G. Palmer, Addison Wesley.

SEMESTER-IV

ELE-S4:01 Marks:80

Digital Communication and Information Theory

Unit I: Information Theory **(10 Lectures)**

Measure of information, Information content of Messages, Markoff Model for Information sources, Entropy and Information rate of Markoff sources, Source encoding, Shannon encoding Algorithm, Discrete communication Channels, Rate of Information transfer over Discrete Communication Channel, Capacity of a discrete memory-less channel, Shannon' s Theory of

Channel Capacity, Numerical Problems (Encoding Algorithms, Rate of Information Transfer and Channel Capacity)

Unit II: Digital Communication (10 Lectures)

Sampling Theorem *(statement and proof)*, Elements of Pulse Code Modulation (PCM), Differential PCM and Delta modulation, Digital modulation techniques (ASK, PSK and DPSK) Data transmission over voice-frequency channels, Noise and signal distortion over telephone circuits, Multi- path propagation over HF channels and Inter-symbol Interference (ISI), Equalization techniques, Linear equalizers, Maximum likelihood detectors, Introduction to NMLDs, Cellular mobile radio communication.

Unit III: Data Communication and Error Control Coding (10 Lectures)

Data Communication codes, Protocols (Character oriented and Bit oriented), Data communication Modems *(Synchronous and Asynchronous),* Data Transmission Modes *(Simplex, Half Duplex and Full Duplex)*, Introduction to Data Communication Networks, PSTN, VAN, ISDN and PSDN, Introduction to Internet. Basic definitions, Error detection techniques, Redundancy, Exact count coding, Parity coding, Vertical and Horizontal redundancy checking, Error correction techniques, Symbol substitution, Retransmission, Linear Block Codes for error detection and correction.

Unit IV: Secure Message Communication (10 Lectures)

Message Jamming and eavesdropping, Active and Passive attacks, Cryptography, Transposition, Substitution and Product ciphers, Public Key Crypto Systems, Introduction to DES algorithm, Pseudo- Noise (PN) sequences (Properties and Circuit Implementation), Spread- Spectrum Modulation (theory and applications), Spread- Spectrum techniques, Direct-Sequence Spread Spectrum (DSSS), Frequency Hopping Spread-Spectrum and Time Hopping Spread-Spectrum.

References:

01. Digital Communication By Simin Hykin,
02.Digital and Analog Communication by K. Shan Mugam,.

03. Digital and Analog Communication by Tomasi,
04. Telecommunication Switching Systems and Networks by T. Viswanthan, PHI.

Note for Examiner:

Eight questions to be set, two from each Unit

Note for Examinee:

Four questions to be attempted selecting one question from each Section

Time Allowed: Three Hours

ELE-S4:02 Marks:80

Electronic Instrumentation

Unit I: Electronic Instruments for basic Parameters (10 Lectures)

Transistor Voltmeter, FET I/P Voltmeter, Differential FET Voltmeter, Chopper type Voltmeter, AC voltage measurement, Diode rectifier meter, Bridge rectifier meter, Peak reading meter, AC voltmeter using Rectifier/Amplifier, True RMS voltmeter, Electronic multiplier, Consideration in choosing an analog voltmeter, Q-meter, Basic Q meter circuit, Series connection, Parallel connection, Sources of errors, A LCR meter, Direct reading LCR meter, Capacitance inductance meter, Direct reading digital LCR meter, Vector impedance meter, Vector voltmeter

Display Devices

Multi Trace Oscilloscope, Dual trace Oscilloscope, Dual beam Oscilloscope, Sampling Oscilloscope, Storage Oscilloscope, Analog storage Oscilloscope, Digital storage Oscilloscope, Comparison between Analog and Digital storage Oscilloscope

Unit II: Signal Generator and Analysis (10 Lectures)

Sine Wave generator, Signal generator, Standard signal generator, Frequency synchronized signal generator, Sweep frequency generator, Random noise generator, Pulse and Square wave generator, Audio frequency signal generator, RF generator, Function generator, Waveform generator,

Signal Analyzer

Harmonic distortion analyzer, Wave analyzer, Frequency selective wave analyzer, Heterodyne wave analyzer, Application of Wave analyzer, Spectrum Analyzer, Basic Spectrum Analyzer, Spectrum Analyzer characteristics, Real time spectrum analyzer, Swept tuned spectrum Analyzer, Spectrum Analyzer development, Logic Analyzer, Operation of a logic analyzer.

Unit III: Digital Instruments **(10 Lectures)**

Digital Voltmeter, General Characteristics, Ramp type DVM, Staircase ramp DVM, Successive approximation, Integrating type DVM, Servo DVM, Continuos balance DVM, Dual slope A/D DVM, Potentiometric type DVM, Atomization of DVM, Universal counter timer, Digital time measurement, Heterodyne wave meter, Digital ohm meter, Digital capacitance meter Digital modulation index meter, Digital quality factor meter Digital tan delta meter, Digital IC tester.

Unit IV: Analytical Instruments and Noise measurement **(10 Lectures)**

Bio-medical Instruments- ECG, Blood Pressure measurements, Spectrophotometers, Electron Microscope, X-ray diffractometer, Radio Telemetry, Nature of noise in electrical systems, Frequency and power Spectra, Signal Recovery, Filtering, Signal Averaging, Lock in amplifiers.

References:

01. Modern Electronic Instrumentation and Measurement Techniques by Cooper and Helfrick, PHI.
02. Electrical and Electronic Instrumentation by Hai Hung Chiang, John Wiley & Sons.
03. Students Reference Manual for Electronic Instrumentation Laboratories by Stanly Wolf and Richard F. M. Smith, PHI.
04. Principles of Electronic Instrumentation by A. James Diefenderfer, Holt sunders Int. edition.
05. Electronic Instrumentations and Measurements by Larry Jones and A. Foster Chin, John Wiley & Sons.
06. Digital Measurement Techniques by T. S. Rathore, Narosa Publishing House, New Delhi.

ELE-S4:03 Marks:80

VLSI Technology

Unit I : Crystal Growth, and Epitaxy **(10 Lectures)**

Crystal Growth and Wafer Preparation, Electronic grade Germanium and Silicon, Zone melting process of purification, Simple purification process, Czhrolaski method.

Epitaxy, Vapor phase epitaxy, Transport process and Reaction kinetics, Doping in epitaxial layers, Epitaxy equipment details, Molecular beam Epitaxy process *(in brief)*.

Unit II: Diffusion and Oxidation (10 Lectures)

Fick's one dimensional diffusion equation, Diffused layers, Pre deposition step, Drive- in diffusion with expression, Field aided diffusion, Diffusion system, C-V technique for profile measurement, Junction depth and sheet resistance measurement.

Oxidation Techniques, Growth mechanism and Kinetics of Oxidation layers, Oxidation techniques and Systems.

Unit III: Lithography Etching (10 Lectures)

Lithography, Lithography process and Types of Lithography, Optical Lithography, Contact proximity and projection Lithography techniques, Resists, Electron beam Lithography, Electron Resists, X- ray Lithography, X- ray resist.

Etching, Subtractive and Additive method of pattern transfer, Resolution and edge profiles in Subtractive pattern transfer, Selectivity and feature size control of an etching process, Plasma and chemical etching of Silicon dioxide and Various metals used for metalization.

Unit IV: Metalization and IC Technology (10 Lectures)

Contacts *(Ohmic and rectifying)*, Physical vapor deposition, Methods of physical vapor deposition, Resistance heated evaporation, Electron beam evaporation, Inductive heated evaporation, Sputter deposition, Process and System details of PVD, Thickness measurement and monitoring.

Technology, Basic consideration for IC processing, Bipolar IC technology, NMOS IC technology, CMOS IC technology, Miniaturizing VLSI circuits, Modern IC fabrication.

References:

01. Physics of Semiconductor Devices S. M. Sze, , Wiley eastern Ltd.
02. Electronic Processes in Semiconductors, Azeroff and Brophy, , McGraw Hill Publishing company.
03. Physics and Technology of Semiconductor Devices A. S. Grove, , John Wiley and Sons, New York.
04. Solid State Electronic Devices Ben G. Streetman, , Prentice Hall of India Ltd, N. Delhi.
05. S. M. Sze, VLSI Technology, Mcgraw Hill Publishing Company.

Semester- I

Laboratory -I

ELE-S1:06 **Marks:80**

01. To design and realize combinational circuits using basic logic gates.

02. To design and realize sequential logic circuits using basic logic gates.

03. (a) To design multiplexer using two input NAND gates and study 74150 chip.

(b) To study and design DEMUX using two input NAND gates and study 74154 chip.

04. To design and study RC coupled amplifier using BJT's and FET's.

05. To study and realize clock pulse generator using 555 timer and JK Flip-Flop.

06. To measure various parameters of an operational amplifier IC 741viz.,
(i) Open- loop gain.
(ii) Offset voltage.

(iii) CMRR.

(iv) Slew rate.

07. To study and realize an analog –to- digital converter.
08. To design and study a voltage controlled oscillator using an Op Amp.
09. Experiments on Object Oriented Programming using C++. (Five Experiments).

Semester- I

Laboratory -II

ELE-S1:07 **Marks:80**

01. To design and realize AM modulator and Demodulator circuit.
02. Write a programme to simulate:
(a) a sinusoidal signal with given parameters.
(b) an AM wave.
(c) an AM- DSBSC wave.
(d) an AM- SSBSC signal.

03. To generate a FM wave using voltage controlled oscillator and demodulate it using

04. (a) To generate a Square Wave frequency modulated (SWFM) wave.
(b) To demodulate a SWFM wave using Phase locked loop (PLL).

05. To design and test a frequency synthesizer using PLL 565 IC.
06. To study a TV receiver kit and identify it's various functional blocks.
07. To study AM and FM radio receiver kits.
08. To realize phase shift oscillator using an Op-Amp and find its practical and computed frequencies.
09. To design and test a Multi-vibrator using OA.

10. To study op- amp IC 741 as schmitt's trigger and measure the hystersis.

11. (a): To study and realize OA- based pulse generator.

(b): To study OA – based Multi-wave generator.

12. To simulate various networks using PSPICE package (Three experiments).

Semester- II

Laboratory -I

ELE-S2:07 **Marks:80**

01. To design and fabricate a regulated power supply with given parameters and study the regulation factor.

02. To design active low pass, band pass and high pass filters using OA as active circuit building block.

03. To study and realize thyristor firing circuit.

04. To study thyristor characteristics.

05. To study and realize thyristor with natural commutation.

06. To study and realize step- down chopper.

07. To study and realize step- up chopper.

08. To Develop and execute programs in Assembly Language Programming using 8086 up kit (Five Experiments).

09. Object Oriented Programming using C++ (Three experiments).

Semester- II

Laboratory -II

ELE-S2:07 **Marks:80**

01. To study and interface a circuit to read data from an ADC using 8255-A in the memory mapped I/O mode.
02. To study and interface a circuit to convert digital data into analog signal using 8255-A in the memory mapped I/O mode.
03. To study and interface a Stepper motor with a microprocessor.
04. To Study various Networking Operating Systems; e.g. Win2000 etc.(Two experiments).
05. Experiments on Multi-user operating System (two Experiments).
06. Experiments on Opto-Electronics (three Experiments).
07. To simulate various active filter networks using PSPICE package and Electronic Workbench (Three experiments).

Semester- III

Laboratory -I

ELE-S3:06 **Marks:80**

01. To design and implement a circuit for the generation of:

    (a) Pulse width modulation (PWM) wave.

    (b) Pulse position modulation (PPM) wave.

02. To generate a pulse- position- duration- modulation (PPDM) wave for transmitting two signals through a common carrier.

03. To study pulse code modulation (PCM) / demodulation using the PCM module.

04. To study 1- bit error detection correction using (7, 4) block code module.

05. To design and test a simple circuit for data scrambling and descrambling.

06. To design and test a circuit for generating a Psuedo- noise (PN) signal.

07. Write a program to simulate a linear quantizer and evaluate its performance.

08. To study random number generation using a Digital Computer and Simulate:

    (a) Uniformly distributed random numbers.

    (b) Guassian distributed random numbers.

09. To study and realize Hamming Error generator and Correction code converter.

10. Booth's Algorithm for Multiplication.

11. To study and realize an Up-down and skip by n counter.

12. To study and realize 4-bit binary to decimal converter using 7-segment display.

13. To study and realize 2's complement addition and subtraction.

Semester- III

Laboratory -II

ELE-S3:07 **Marks:80**

01. To design and test an instrumentation amplifier.
02. To study and realize the T. F. and their control in s and t domains of simple circuits.
03. To investigate the principal of operation of a wave analyzer by fabricating and analyzing the operation of a basic wave analyzer circuit.
04. To investigate the frequency response of general-purpose ac voltmeters.
05. To design and test various circuits using the following transducers:
    (a) Microphone.
    (b) Loud speaker.
    (c) Light dependent resistor (LDR).
06. To study and realize the control of the loading effect of different cascaded Networks.
    e.g. for two similar cascaded Networks $G(s) \neq [G(s)]^2$.
07. To study and realize the T. F. and their control of Networks by Mason's formula.
08. To obtain control of oscillatory response of an oscillatory circuit by controlling the position of its poles.
09. To realize various control functions using 555 timer, logic gates and transducers.
10. To design, fabricate and calibrate a basic ac voltmeter circuit using both half- wave and full-wave rectification.
11. To analyze the dc voltmeter with a direct- coupled amplifier.
12. To study balanced- bridge dc amplifier with input attenuateor and indicating meter.
13. Experiments on Digital Signal Processing using MatLab (Four experiments).
14. Implementation the various Algorithms using C or C++ and test it over a selected pattern.