

**SCHEME OF EXAMINATION
&
SYLLABUS
CODE 341 & 342
FOR M. Sc. (ELECTRONICS)
(SEMESTER SYSTEM)**

UNDER

FACULTY OF SCIENCE

Approved by Board of Studies in Electronics

EFFECTIVE FROM JULY 2014



School of Studies in Electronics and Photonics

Pt. Ravishankar Shukla University

Raipur (C.G.) 492010

PH: - 0771-2262639

WEBSITE: -www.prsu.ac.in

Approved by Board of Studies in Electronics on 20th September 2013

PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR

**Scheme of Examination
M.Sc. (Electronics)
(Semester System)**

EFFECTIVE FROM JULY 2014

M.Sc. Electronics is a four semester course spread over the period of two years. The School of Electronics, Pt Ravishankar Shukla University, Raipur offers this course on its campus. It is designed to offer in depth knowledge of the subject starting from its basic concepts to the state of art technologies in use today. Students are also provided extensive laboratory training on the course content and the current requirements of industries and R and D. In the final semester every student has to undertake a project. Advanced papers are offered to the students in the areas of Communications, Photonics, Digital Signal Processing, Embedded Systems, Power Electronics and Neural network. In addition the course caters to the requirements of providing complete exposure to NET/SET syllabus for Electronics formed by the U.G.C.

The following shall be the scheme of examination for the course:

Semester - I

Theory	Marks		
	Theory	Internal	Total
Paper 101. Analog Integrated Electronics and Physics of Electronic Materials	80	20	100
Paper 102. Digital Design and Applications	80	20	100
Paper 103. Signals, Mathematical and Computational Methods in Electronics	80	20	100
Paper 104. Optical , Quantum and Organic Electronics	80	20	100

Practical	Max	Experiment	Internal	Viva
1. Lab course "A" Analog Electronics Lab	100	60	20	20
2. Lab course "B" Digital electronics Lab	100	60	20	20

Total Marks for Semester I=600

Semester - II

Theory	Marks		
	Theory	Internal	Total
Paper 201. Network Analysis and Synthesis	80	20	100
Paper 202. Microprocessor and C++ Programming	80	20	100
Paper 203. Analog and Digital Communication Systems	80	20	100
Paper 204. Electromagnetic plane wave, Transmission lines and Microwave Devices	80	20	100

Practical	Max	Experiment	Internal	Viva
1. Lab course "C" Analog and Digital Communication Lab	100	60	20	20
2. Lab course "D" –8085 Microprocessor Programming, Study Cards and Interfacing Lab	100	60	20	20

Total Marks for Semester II=600

Semester - III

Theory	Marks		
	Theory	Internal	Total
Paper 301. Advanced Microprocessor and Interfacing	80	20	100
Paper 302. Data Communication, Mobile and Wireless Communication	80	20	100
Paper 303. Instrumentation and Measurement	80	20	100
Paper 304. Power Electronics, Information Theory and Coding	80	20	100

Practical	Max	Experiment	Internal	Viva
1. Lab course "E" - Optical Electronics, Transducer and Instrumentation Lab	100	60	20	20
2. Lab course "F" – 8086 Microprocessor Programming,	100	60	20	20

Interfacing and "C++" Programming Lab				
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Total Marks for Semester – III = 600

Semester IV

Theory	Marks		
	Theory	Internal	Total
Paper 401. Digital Signal Processing	80	20	100
Paper 402. Optical and Satellite Communication	80	20	100
Paper 403. Automatic Control System and Artificial Neural Network	80	20	100
Paper 404. Embedded System and Microcontroller	80	20	100

Practical	Max	Experiment	Internal	Viva
1. Lab course "G" - Optical Communication and 8051 Programming Lab	100	60	20	20
2. Project & Seminar	100	80	-	20

Total Marks for Semester – IV = 600

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M. Sc. Electronics

July - Dec 2014

Semester – I

Paper 1 - Analog Integrated Electronics and Physics of Electronic Materials.

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Unit I – Physics of Electronic Materials

Crystal structures, classification of crystals, lattices, reciprocal lattice, Miller indices, amorphous materials. Lattice Vibration and Phonons ,Bloch theorem ,Phonons, Nearly Free electron theory. Dielectric properties, electronic polarisability, Clausius Mossotti relation, dielectric Constant static and frequency dependent.

Semiconductors: Direct and indirect band gap methods to determine the Forbidden gap, mobility and conductivity, intrinsic and extrinsic semiconductor, Impurities, carrier concentration, electrical properties of Ge and Si, experimental methods to study the electrical parameters, Drift and Diffusion, Hall effect, electrons and phonons in semiconductors.

Unit II –Transistor analysis at low frequencies

Review - Transistor Characteristic viz CE, CB and CC configuration of BJT, Principle of operation and characteristic of JFET and MOSFET,

Transistor at low frequency - Graphical analysis of CE configuration, Transistor hybrid Model, h- Parameters and their variations, analysis of a transistor amplifier circuit using h-parameter, Emitter follower, comparison of transistor amplifier configurations, Miller's Theorem and its dual, cascading transistor amplifiers, Simplified hybrid model – CE and CC configuration, common emitter amplifier with an emitter resistance.

Transistor biasing and stabilization.

Unit III – Multistage and Feedback Amplifiers Analysis

Transistor at high frequencies, Hybrid – pi model, gain bandwidth product.

Multistage Amplifiers Analysis - Introduction, frequency response of an amplifier, band pass of cascaded stages, Coupling scheme - RC coupled, transformer coupled and direct coupled amplifiers, low frequency response of RC coupled stage, effect of emitter bypass capacitor on low frequency response, high frequency response of two cascaded CE transistor stages.

Feedback Amplifiers – Basic concept, types of feedback method of analysis of a feedback amplifier.

Unit IV – Operational Amplifier, Characteristics and Applications

Basic operational amplifier and its characteristics, characteristics of ideal and practical operation amplifier, parameters of operational amplifier, measurement of operational amplifier parameters, frequency response of operational amplifier, Linear and Nonlinear Circuits analysis using operational amplifier - Inverting and Non inverting Amplifiers, Differentiator, Integrator, Voltage to current converter, Instrumentation amplifier, Sine wave Oscillator, Low pass and band – pass filters, Comparator, Multivibrator and Schmitt trigger, Triangular wave generator, Log and Antilog amplifiers

Unit V - Integrated Circuit Fabrication and Characteristics

Integrated circuit technology - SSI, MSI, LSI, VLSI, basic monolithic integrated circuits, planner process, epitaxial growth, masking and etching, diffusion of impurities, bipolar transistor fabrication, fabrication of FET, CMOS technology, monolithic diodes, integrated registers, integrated capacitors and inductors, monolithic circuit layout, metal semiconductor contact, packaging and characteristic of integrated circuit components.

TEXT BOOKS

1. Integrated electronics – Analog and digital circuits and systems Jacob Millman, Cristos, C. Halkias, Tata Macgraw- Hill
2. Electronic Devices and Circuit Theory, 9th ed. Boylestad & Nashelsky PHI
3. Microelectronics - Jacob Millman, Arvin Gabel, Tata Macgraw- Hill
4. Physics of Semiconductor Devices: Shur PHI
5. A Textbook of Applied Electronics (M.E.) Sedha R S, S. Chand Pub.
6. Physics of Semiconductor Devices: Sze
7. Ramakant A.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall
8. Principal of Electronic Material & Dev : S O Kasap

Paper 2 - Digital Design and Applications

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Unit I - Basic Logic Circuit

Introduction of basic gates, universal gates, number systems and codes, Boolean algebra, switching characteristics of semiconductor devices. logic gate characteristics - speed of

operation, power dissipation , figure of merit, fan in, fan out, noise margin. Logic families - RTL, DTL, TTL, ECL interfacing, ECL and TTL. MOS logic - MOSFET NAND and NOR gates, CMOS inverters, CMOS - NAND and NOR gates, interfacing CMOS and TTL, interfacing CMOS and ECL, comparison of logic families.

Unit II - Combinational Logic Design

Simplification of Boolean algebra using K- map, minterm and maxterm, design of binary adder, subtractor , digital comparator, parity generator/checkers, priority encoder, BCD to 7 - segments decoder, multiplexer , multiplexer tree, demultiplexer and demultiplexer tree.

Unit III - Sequential Circuit Design

Excitation table of flip flops – S - R, J-K, Master-Slave – JK, D and T flip-flops, clocked flip flop design – conversion of one form of flip flop to another type.

Analysis of clocked sequential circuits - State equation, state table, state diagram, state input equations, analysis with - flip flops, JK flip flops and T flip flops.

State reduction and assignment, design procedure – synthesis using D flip flops, JK Flip flops and T flip flops.

Unit IV - Registers, Counters and A/D, D/A converters

Registers - Shift registers, application of shift registers, serial to parallel converter, parallel to serial converter.

Counters - Ring counter, modulo- n- counter, synchronous counter –ripple counter (binary, BCD) and up-down counter, asynchronous counters - ripple counter (binary , BCD) and up-down counter. Other counters – counter with unused states, ring counter, Johnson counter.

A/D, D/A Converters – D/A weighted register type, R/2R ladder type, D/A converter specifications, A/D converters - successive approximation type, parallel comparator, dual slope ADC using voltage to frequency conversion and frequency to time conversion.

Unit V - Semiconductor Memories

Memory organization and operation , write operation, read operation , expanding memory size and word capacity , classification and characterization of memory, sequential memory ROM, dynamic ROM, RAM cell, content addressable memory (CAM), PLA, CCD, PAL.

TEXT BOOKS

1. Digital Design - M. Moris Mano, PHI Publication.
2. Modern Digital Electronics - R.P. Jain, Tata Mcgraw.
3. Digital Principal and Application - Malvino Leach, Tata Macgraw Hill
4. Digital Systems: Principles and Applications, 10th ed. Tocci, Widmer & Moss PHI

PAPER 3 – Signals, Mathematical and Computational Methods in Electronics

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UNIT I - Signal Analysis

Introduction – Classification of signals and systems, some ideal signals, energy signal,

power signals, energy and power spectral densities.

Fourier Series, Complex Fourier Spectrum, The Fourier Transform, Continuous Spectrum, Fourier Transform involving Impulse Function, Properties of Fourier Transform, Fourier Transform of Periodic Functions, Convolution, Sampling Theorem.

UNIT II – Linear Systems and State Variables Techniques

Introduction, System Function (Transfer Function), Distortion less Transmission, Paley-Wiener criterion, Correlation, Autocorrelation.

State Variables Techniques - State variable concepts, form of the state equations, time domain and frequency domain solution of state equations, state transition matrix, state equations for networks, state equations from transfer functions.

UNIT- III- Probability and Random Signal Theory

Introduction, set theory, Introduction to Probability, Conditional Probability Statistical Impedance, Baye's Theorem, Random variables, Discrete and Continuous Random Variables, Joint Distributions, Characteristics of Random Variables, Binomial, Poisson and normal Distributions, Uniform and other Distributions, Random and Markov Processes.

UNIT IV - Mathematical Methods

Laplace Transform – Definition, transform of elementary function, properties of Laplace transform, convolution theorem, application to differential equation, simultaneous Linear equations with constant coefficients, unit step and unit impulse function .

Special Function - Bessel equations, recurrence formula, expansion for J_0 and J_1 , values of $J_{1/2}$, generating function for $J_n(x)$, equation reducible to Bessel equation.

UNIT V – Computational Methods

Numerical Differentiation and Integration

Finite Differences, Derivatives using Forward, Backward and Central Difference Formulae, Newton-Cote's Quadrature formula, Trapezoidal rule, Simpson's rules, Weddle's rule.

Numerical methods for Solution of Ordinary Differential Equation-Picards Method ,Taylor Series Method , Eulers and Modified Eulers methods, Runge and Runge Kutta Methods , Predictor and Corrector Method. Applications in solution of Poisson's equation.

TEXT BOOKS

1. Communication System- Analog and Digital - R.P.Singh & S.D. Sapre TMH .
2. Signal and System - Nagrath, Sharan and Ranjan. Mcgraw hill Publishing
3. Signal and Systems - Rodger E. Ziemer. Continuous and Discrete 2nd ed.Maxwell Macmillan Int. Edition,
4. Higher Engineering Mathematics - B.S. Grewal, Khanna Publications

5. Numerical Methods - Kandaswami, Thilagavathi and Gunavathi, S. Chand & Co.
6. An introduction to Numerical methods: A MATLAB approach by Abde/Wahab Kharab,
Ronald B Guenther

Paper 4-Optical, Quantum and Organic Electronics

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Unit I - Quantum Electronics

Coherent light sources, basic principle of lasers, laser pumping, stimulated emission, light amplification, threshold condition, Einstein's coefficient, laser rate equations for two, three and four level laser systems, variation of power around threshold, rectangular cavity, open plane resonator, mode locking and Q-switching of lasers.

Unit II - Applications of Quantum Electronics

Types of Lasers - Ruby Laser, He-Ne laser, Ar-ion laser, Co₂ laser, dye laser and semiconductor laser.

Laser Applications - Laser in manufacturing, laser cutting of material, laser marking, laser transmitter, measurement of distance through Laser.

Unit III - Optical Display Devices

Optical Display Devices - LED- Basic principle of operation, radiative recombination process, the spectrum of recombination process, the internal quantum efficiency, double heterostructure, response time of LED, carrier configuration and modulation bandwidth, edge emitting LED, LED design. Liquid Crystal Display - construction, basic principle of emission, Plasma Display- construction, basic principle of emission.

Unit IV - Photo Detectors and Organic Electronics

Photodiodes- General principles, quantum efficiency, silicon P-N photodiodes, heterojunction photodiodes, Schottky barrier diode, P-I-N photodiodes, avalanche photodiodes, and phototransistors.

Introduction to Organic Electronics, Organic versus Inorganic solids, Molecular materials, Organic Semiconductors, Electronic states in conjugated molecules, Conjugated polymers

Unit V - Electro-Optical Devices

Electro-Optic Effect - Kerr effect, Pockels effect, Faraday effect, Electro-Optic Modulator- Electro-optic phase modulator, electro-optic amplitude modulator, Kerr modulator.

Acousto-Optic Effect - Raman-Nath and Bragg Diffraction, Raman-Nath acoustooptic modulator, Bragg modulator, acousto-optic modulator.

Magneto-Optic Effect - Faraday's effect, magneto-optic modulator.

TEXT BOOKS

1. Optical Electronics - Ghatak Thyagarajan, University Press
2. Optical Communication System - John Gower, PHI Publication.
3. **Optoelectronics Devices & Systems - S.C. Gupta, PHI Publication.**
4. Optoelectronics - An Introduction - J.Wilson and J.F.B. Hawkes, PHI Publication.
5. Semiconductor Optoelectronic Devices, 2nd ed. **Bhattacharya PHI**
6. Pope and Swenburg, Electronic Processes in organic crystals and polymers, 2 nd Ed., Oxford
7. Organic molecular crystals, E.A. Sininsh EA and V. Capek.

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M. Sc. Electronics
Jan-June 2015
Semester-2

Paper 1-Network Analysis and Synthesis

1. Student should be allowed to use Programmable Scientific Calculator in Examination hall
2. Special graph paper viz. Polar graph & Semi log graph papers should be provided to the students in the examination hall.

Unit I - Mesh and Node Analysis and Network Theorems

Mesh and Node Analysis - Kirchhoff's laws , Star and Delta conversion, source transformation, mesh and node analysis of electric circuits, response of the network by differential equation and Laplace transform method ,initial conditions in the network.

Network Theorems - Thevenin's theorem, Norton's Theorem, Superposition, Millman theorem, Maximum power transfer theorem, and Reciprocity theorem, Tellegen theorem and Substitutions theorem .

Unit II – Coupled Circuit , Waveform Synthesis and Graph Theory

Coupled Circuit – Dot convention and magnetic coupling.

Waveform Synthesis – Standard signals , unit step function ,ramp function , impulse function ,initial and final value of $f(t)$ from $F(s)$, the convolution integral.

Graph Theory - Concept of a network graph, twigs and links, trees, co trees ,formation of incidence matrix ,cut-set matrix, tie-set matrix and loop currents, analysis of networks ,network equilibrium equation ,duality, network transformation

Unit III - Network Function and Frequency Response Plots

Network Function - Network function for one port and two port, the calculation of network functions - ladder networks and general networks, pole and zero of network functions, restrictions on pole and zero locations for driving point functions ,restrictions on pole zero locations ,time domain behavior from the pole and zero plot, stability of active networks.

Frequency Response Plots- Magnitude and Phase plots, Root Loci, Bode Diagrams, Nyquist- Stability Criterion.

Unit IV -Two Port Network Analysis

Relationship of two port variable , Z-parameters, Y- parameters, Hybrid parameters, ABCD parameters, conditions of reciprocity and symmetry, inter-relationship between parameter of two port network, different types of interconnections of two port networks.

Unit V- Network Synthesis

Concept, Procedure of Synthesis, Reactive Networks, Properties of Expressions of Driving point Admittances of L-C Networks, Pole-Zero Interpretations in L-C Networks. L-C Networks Synthesis-Foster's Canonic Form (First and Second Foster form), Significance of Elements in the Foster form. Cauer Canonic form of Reactive Networks-First and Second form of Cauer Networks, Applicability of Foster and Cauer forms, R-L & R-C Network Synthesis by Foster form, Identification of foster form , Identification of Admittance, R- L& R-C Network Synthesis by Cauer form, Identification of Immittance Function in Cauer form, Determination of end elements in Foster and Cauer R-L & R-C Networks.

TEXT BOOKS

1. Networks and System - D. Roy Choudhary, New Age International
2. Network Analysis : M.E. Van Valkenburg.PHI
3. Circuit theory (analysis and synthesis) - A. Chakrabarti, Dhanpat Rai and co.
2. Network Synthesis : M.E. Van Valkenburg.PHI

Paper 2 - Microprocessor and C++ Programming

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Unit I - Micro-Computer System & 8085 Microprocessor Architecture

Microcomputer System & its operation- Overview of a basic Microcomputer structure and operation, Ideal microprocessor. Microprocessor evolution and types, Microprocessor initiated operation & Bus organization, internal data operation & registers, peripheral initiated operation.

Memory- Memory organization, memory map, memory & instruction fetch, types of memory. Interfacing Devices - Tri-state devices, buffer, decoder, encoder, latch.

Microprocessor Architecture - Introduction to 8085 Microprocessor, pin diagram & its function, bus timing, demultiplexing of address & data Bus, generation of control signals, microprocessor architecture of 8085, decoding & execution of an instruction, memory interfacing, timing diagram of memory, read & write cycle.

Unit II - Instruction Set & Programming of 8085, Stack & Subroutines

Instruction classification ,instruction format , addressing modes, basic instructions and simple programming ,Additional Instructions - DAA, DAD, LHLD.SHL, PCHL, STC, XCHG, XTHL and programming, Code Conversion - BCD to Binary, Binary to BCD, Binary to ASCII, ASCII to Binary.

Stack & Subroutines - Concept of stack, PUSH/POP instruction, illustrative example. Concept of subroutines, call & return instruction, conditional call & return instruction, advanced subroutines concept.

Unit III - Counters, Time Delay, Interrupts & Interrupt Controller

Counters and Time Delay -Time delay using one register, Time delay using a register pair, flow chart & program for a hexadecimal counter and modulo 10 counter, delay calculations.

Interrupts - Interrupts of Intel 8085, hardware and software interrupts, vectored/non vectored interrupts, maskable/non- maskable interrupts, Interrupts priority concept, DI,EI, RIM, SIM instructions, pending interrupts.

Programmable Interrupt Controller - Architecture of 8259, initialization command words (ICW's), operational command words (OCW's), 8259 interrupts mode, simple initialization program for 8259.

Unit IV - Data Transfer & Peripheral Interfacing Devices

Format of data transfer, modes of data transfer, microprocessor controlled data transfer, peripheral control data transfer, peripheral I/O instruction, serial I/O lines, SOD and SID.

Programmable Peripheral Interfacing Devices - Programmable keyboard / display interface – 8279, Programmable peripheral interface – 8255, Programmable interval timer – 8253, Programmable Interrupt controller – 8259, Synchronous data communication device – 8251, DMA Controller 8257, RS 232 interface.

Unit V- “Object Oriented Programming

Principles and Basic concepts, OOPs languages, Application of OOPs. Simple programming in C++. Tokens, expressions and control structures - Tokens, keyword, identifiers and constants, declaration of variables, operators in C++, manipulators, control structure.

Functions in C++ - main function, function references, return references, default arguments and constant arguments. Classes and Objects- C structures revisited, specifying class, C++ program with classes, arrays within Classes, memory allocation of objects, arrays of objects, returning objects, pointer to members, local classes.

TEXT BOOKS

1. Microprocessor Architecture Programming - Ramesh S. Gaonkar & Application with 8085/8080 Penram Int. Pub2.
2. 0000 to 8085: Introduction to Microprocessors for Engineers and Scientists,

2nd ed. Ghosh & Sridhar PHI

3. Fundamentals of Microcomputer & Microprocessor r - B.Ram, Dhanpat Roy Pub.

4. Object Oriented Programming E - Balaguruswamy with C++ Second Edition

5. PROGRAMMING IN C++ P.B.MAHAPATRA,S Chand & Co

Paper 3- Analog and Digital Communication Systems

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Unit I Radiation and Propagation of Waves - Electromagnetic Radiation –Effect of environment. Propagation of waves –Ground Wave and Sky-wave Propagation – The ionosphere – Space waves – Tropospheric scatter propagation – Extraterrestrial communications.

Introduction to Communication Systems -Block diagram of communication system – Transmitter, Receiver, Modulation, Bandwidth requirements.

Noise - Source of Noise, External Noise –Atmospheric Noise, Extra Terrestrial Noise, Industrial Noise, Internal Noise-Shot Noise, Resistor or Johnson Noise ,Calculation of noise in Linear Systems, Noise Bandwidth, Power, Noise Temperature, Noise in Two Port Networks, Noise Figure, Cascaded stages, Measurement of Noise Figure, Signal in presence of Noise, Narrowband Noise.

Unit II – Amplitude Modulation System

Amplitude Modulation - Frequency spectrum of AM wave, Representation of AM wave, Power relation in AM wave. Single side band techniques – Suppression of carrier, suppression of side bands, vestigial side band,

Transmitters - Classification of radio transmitter, AM radio transmitter, Generation of AM -Transistor as AM Generator, balanced modulator, filter method, phase shift method, third method.

Receivers – Classification of radio receiver, basic function of AM receiver, tuned radio frequency receiver, super heterodyne receiver, AM demodulation – RC demodulator, square law demodulator. Noise in Amplitude Modulated Systems, Comparison of various AM systems.

Unit III – Angle Modulation System

Angle Modulation – Frequency modulation, analysis of FM waveform, frequency spectrum, Bessel function, Narrowband FM and Wide Band FM, Phase modulation.

FM Modulators and Transmitters - Method of frequency modulation – Direct method – reactance modulator (FET and varactor diode method),Indirect Method, pre-emphasis and de-emphasis.

FM Demodulators and Receivers – Super heterodyne FM receiver – block diagram, amplitude limiter, FM demodulator –phase discriminator, ratio detector, PLL demodulator. Comparison of AM, FM and PM, , frequency division multiplexing(FDM).

Unit IV - Pulse Modulation System

Pulse Amplitude Modulation - Natural Sampling, flat top sampling, equalization signal recovery to holding, PAM modulator and demodulator. Pulse time modulation (PTM)- Generation of PTM signals, PTM modulator and Demodulator, time division multiplexing (TDM).

Pulse Code Modulation- Quantization of signals, quantization error, pulse code modulation (PCM), companding, Bandwidth of PCM System, Noise in PCM System, Differential pulse code modulation, Delta modulation, Adaptive Delta modulation.

Digital Modulation Techniques - Introduction, Binary Phase Shift Keying (BPSK), Differential Phase Shift Keying (DPSK), Quadrature Phase Shift Keying (QPSK), Quadrature Amplitude Shift Keying (QASK) and Binary Frequency Shift Keying (BFSK).

Unit V – Monochrome and Colour Television

Elements of a TV System - Concept of Picture and sound transmission and reception, Flicker, Composite Video Signal, signal transmission and Channel bandwidth, Monochrome picture tube, Television Camera tube - Vidicon and CCD. Monochrome TV transmitter and receiver (Block Diagram). Essentials of Colour TV - Three Colour theory, Luminance, Hue and saturation, Triniton Colour Picture tube, Block diagram of Colour TV transmitter and receiver, PAL Colour TV System. CCTV, HDTV, CATV and DTH, Concepts of Home Theatre.

TEXT BOOKS

1. Principles of Communication Systems - Taub & Schilling, TMH
2. Principles of Communication Systems - George Kennedy, TMH
3. Communication System- Analog and Digital - R.P.Singh & S.D. Sapre TMH
4. Radio Engineering - G. K. Mithal G.K. Pub.
5. Monochrome and Colour Television - R.L. Gulati, New Age International, Wiley Eastern Ltd. New Delhi.
8. Advanced Electronic Communication Systems: Tomasi PHI
9. Television Engineering – A.M. Dhake, TMH
10. Electronic communication, Roddy and Coolen, PHI, New Delhi,

Paper 4- Electromagnetic Plane Wave, Transmission Lines and Microwave Devices

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UNIT I - Electromagnetic Plane Wave

Electromagnetic Plane Wave - Electron motion in electric field , electron motion in magnetic field , electron motion in electromagnetic field, electric and magnetic wave equations, Maxwell equation, Poynting theorem, uniform plane wave and reflection, uniform plane wave propagation in free space and lossless dielectric, plane wave propagation in lossy media, Ionospheric propagation.

UNIT II - Transmission Lines and Antennas

Transmission Line - Basic equation , reflection and transmission coefficient , standing wave and standing wave ratio , line impedance and admittance, Determination of characteristics impedance, Fundamental of Smith Chart, Impedance Matching: Single and Double Stub Matching, microwave Coaxial Connectors.

Antennas – The Radiation mechanism, Current and Voltage distribution, Antennas gain, Antenna resistance, Bandwidth, Beam width and Polarization, effects of Antenna height, Dipole arrays, Folded dipole. Microwave Antennas - Parabolic reflector, Horn and Lens antenna. Special purpose antennas - Yagi, Log periodic and Loop antennas.

UNIT III – Microwave Waveguides and Components

Waveguides - Rectangular Wave guide – TE and TM modes , power transmission, excitation in rectangular wave guide , circular wave guides – TE,TM and TEM mode, **Microwave Components** - Waveguide Tee - E-plane tee, H-plane tee, Hybrid tee, scattering parameters (s-matrix), circulators, isolators , directional couplers.

UNIT IV – Microwave Sources and Measurements

Microwave Sources - Reflex Klystron - principle of operation of velocity modulation, power output and efficiency, electronic admittance. Cylindrical Magnetron – principle of operation, equation of electron motions, cyclotron angular frequency , power output and efficiency.

Microwave measurement techniques, - Microwave bench, precautions, power measurement, bolometric method, attenuation, VSWR, impedance, frequency and Q of the cavity. standing wave measurements, impedance measurement, cavity resonator, dielectric measurements.

UNIT V - Microwave Semiconducting and Avalanche Transit -Time Devices

Microwave Semiconducting Devices

Microwave Transistor – Microwave Bipolar Transistor – principle and amplification phenomenon, power frequency limitation. Microwave Tunnel Diode – principle and characteristics of microwave tunnel diodes, JFET operation and characteristics. Microwave integrated circuit design, introduction, hybrid microwave integrated circuits (HMIC), monolithic microwave integrated circuit (MMIC), MIC materials, substrate material, conductor material, dielectric materials, resistive films, types of MIC'S, microwave monolithic integrated circuits (MMIC'S).

Transferred Electron Devices – Gunn Effect Diodes , GaAs diode Ridley Watkins Hilsum (RWH) theory – Differential negative resistance

Avalanche Transit -Time Devices - Read Diode - Avalanche multiplication, carrier current and external current, output power and quality factor. IMPATT Diodes and TRAPATT Diodes- Principles of operation, power output and efficiency.

TEXT BOOKS

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI Pub

2. Microwave Engineering – Annapurna Das , Sisir K. Das, Tata Mc Graw Hill.

3. Microwave and Radar Engineering - M. Kulkarni, Umesh Publication
4. Electronic Communication Systems - George Kennedy, 3rd Edition TMH
5. Introduction to electrodynamics by David J. Griffiths, PHI
6. Elements of engineering electromagnetics by Narayana Rao, PHI

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SYLLABUS PRESCRIBED FOR THE EXAMINATION OF

M. Sc. Electronics

July-Dec 2015

Semester-3

Paper-1 Advanced Microprocessor and Interfacing

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Unit – I Architecture & Instruction set for 8086 : Architecture and pin configuration of 8086, Instruction Format; Addressing modes, Data Transfer Instruction; Arithmetic Instructions; Branching and Looping Instructions, NOP and Halt, Flag Manipulation Instructions; Logical, Shift and Rotate Instruction. Byte and String Manipulation: String Instructions; REP Prefix, Table Translation, Number Format conversions. Assembler, Directives and Operators; Assembly Process; Translation of assembler Instructions. Programming of microprocessor 8086.

Unit – II System Bus Structure

Basic 8086/8088 system bus architecture, Minimum mode Configuration, Maximum mode configuration; memory interfacing with 8086/8088 in minimum and maximum mode; System Bus Timings, Bus Standards. Interrupts of microprocessor 8086.

Unit – III Architecture of Interfacing Devices

Programmable interrupt controller (PIC) 8259, Programmable DMA Controller (8257). (Architecture and Functioning only) 8-bit ADC and DAC, Programming for Interfacing of 8253/8254, 8251, 8279, ADC and DAC with 8086.

Unit – IV Architecture of 32 bit Microprocessors

Intel 80386 Architecture –Special 80386 Registers –Memory management – interrupts and exceptions – management of tasks –Real, protected and virtual 8086 mode-Introduction to 80486 microprocessor – Architecture – Comparison with 80386 processor.

The IBM PC Motherboard and Drives - Motherboard Components, System Resources,

ROM BIOS Services. **Drives** - Principles of Magnetic Storage, Floppy Disk Drive, Hard Disk Drive, IDE Interface, SCSI Interface, CD-ROM Drive, BIOS Disk Drive Services.

Unit-V High End High Performance Processors

Instructions level Parallelism and Superscalar processors, Advanced Design features, Pentium IV, Power PC, Concept of Pentium Dual Core and Core 2 Duo processors. Mobile Phone Processors IA 64 Architecture - General organization, Predication, Speculation and Software pipelining, Itanium organization. TRIPS (Tera-op, Reliable, Intelligently adaptive Processing System) Future trends in high performance processors.

TEXT BOOKS

1. Microcomputer System-The 8086/8088 Family, Architecture, Programming & Design - Y. U. Cheng Liu & A. Gibson, PHI.
2. Microprocessor & Interfacing - Douglas V. Hall, Tata McgrawHill.
3. The Intel Microprocessor - Barry & Barry, PHI
4. Advance microprocessors and peripheral - Roy and Bhurchandi, PHI
5. Computer Organisation & Architecture - William Stallings, Pearson
6. The Intel Microprocessors 8086/8088. 80186/80187. 80286. 80386. 80486.
7. Pentium Processors - Architecture. Programming and interfacing. PHI, B.B. Brey

Paper 2-Data Communication, Mobile and Wireless Communication

1. Student should be allowed to use Non Programmable Scientific Calculator in Examination hall.

Unit I- Data Communication

Data Signal, Signaling & Data Transmission Media, Communication Mode-Half Duplex/Full Duplex, Data Communication System-Synchronous/Asynchronous Transmission, Serial/Parallel Data, Switching & Multiplexing-Circuit Switching, Message Switching, Packet Switching, Network Topology-Bus/Star/Ring/Mesh Topology, LAN, OSI Reference Model, Network Protocol(TCP/IP).

Unit II- Introduction to Mobile and Wireless Devices

Mobile and wireless devices, history, applications wireless transmission, frequencies for radio transmission, regulations, signals, antennas, signal propagation, multiplexing, modulation, wireless LANs and wireless WANs, spread spectrum, FHSS and DSSS spread spectrum technology, cellular systems, medium access control, specialized MAC.

Unit III- Telecommunications and Broadcast Systems

GSM, mobile services, system architecture, GSM subsystems, GSM communication frame, localization and calling, handover, security, new data services, satellite systems applications, GEO, LEO. MEO, routing, localization, broadcast systems, cyclic repetition of data.

Unit IV- Wireless Networks and others 3G Technologies

Wireless LAN, infrared v/s radio transmission, infrastructure and adhoc networks, IEEE 802.11, architecture (details of protocol not required), DFWMAC schemes, MAC frames, MAC management, roaming, HIPERLAN (just basics, frame and protocol details not required), Bluetooth, applications, physical layer, modes MAC layer, packet format, networking security, link management, brief discussions (frame details and protocols not required) on GPRS, DECT, TETRA, UMTS, IMT-2000, CDPD.

Unit V- Mobile Network and Transport Layers

Mobile network layer, requirements, entities, IP packet delivery, agent advertisement and discovery, registration, encapsulation and tunneling, optimization, messages, reverse tunneling, IPv6, DHCP, Mobile IP, DHCP, adhoc networks, mobile transport layer, traditional TCP, indirect TCP, snooping TCP, mobile TCP, fast transmit/fast recovery, transmission/time out freezing, selective retransmission, transaction oriented TCP.

TEXT BOOKS

1. Data Communication & Networking - Behrouz A Foruzon.
2. Wireless communications and networking" William Stallings, PHI
3. Data and Computer Communications – By William Stallings., 7th Ed., PHI
4. Mobile communications"-by Johan schiller, PEA,2nd ED.
5. Mobile and personal communications systems and services" Rajpandya, PHI
6. Computer Networks - Tanenbaum, PHI.
- 7 Data Communications and Distributed Networks, 3rd ed. Black PHI
- 8 Computer Networks: Protocols, Standards and Interfaces, 2nd ed. Black PHI

Paper –3 Instrumentation and Measurement

1. Student should be allowed to use Non Programmable Scientific Calculator in examination hall.

Unit I-Concept of Measurement

Basic concept of Measurement, Performance & Static Characteristics, Error in Measurement, Types of Errors-Gross, Systematic & Random, Dynamic Characteristics, Zero Order, First Order,& Second Order System, Real Time Element, Specification & Testing of Dynamic Response.

Unit II- Transducers

Fundamental Concept & Transducers Classification Resistance, Capacitance, inductance, Piezoelectric, Thermoelectric, Hall effect, Techogenerator, Optical & Digital Transducers, Measurement of Displacement, Velocity, Acceleration, Force, Torque, Strain, Speed & Sound, Temperature, Pressure, Flow, Humidity, Thickness.

Unit III- Instrumentation Electronics

Instrumentation Amplifiers, Basic Characteristics, D.C. Amplifiers, Isolation Amplifiers, Feedback Transducers system, feedback Fundamentals, Inverse Transducers, Temperature Balance System.

Signal Processing Circuits-Phase Sensitive Detection, Absolute Value Circuit, Peak Detector, Sample & Hold Circuit, RMS Converter, Logarithmic Amplifier, Frequency to Voltage & Voltage to Frequency Converter, waveform Generators, Lock in Amplifiers, SMPS, UPS.

Unit IV-Measuring Instruments

Measuring Instruments- Measurement of R,L,C Bridge, Voltage, Current, Energy, Frequency/Time, Block diagram, working principle and procedure of operation of Digital Voltmeter, Digital Multimeters, Digital Frequency Meter, Q-Meter, Digital Storage Oscilloscope.

Electrometer, Spectrum analyzers, Impedance analyzer, Network analyzers, Logic analyzer, Semiconductor parameter analyzer

Unit V-Biomedical Electronic Instrumentation and Measurements

Introduction to biomedical instrumentation, sources of bioelectric potentials, electrodes-electrode theory, biopotential electrodes, biochemical transducers, cardiovascular measurements- electrocardiography, measurement of blood pressure, blood flow and heart sound, plethysmography, the elements of intensive care monitoring; calibration and reparability of patient monitoring equipment, pace makers.

TEXT BOOKS

- 1.Instrumentation Devices & Circuit System -Rangan,Sharma& Mani,
- 2.Transducers& Instrumentation -D.V.S.Murthi.PHI
- 3.Biomedical instrumentation and measurements – Leslie Cromwell, fred J. Weibell, Erich A. Pfeiffer
4. Electronic Instrumentation - H. S. Kalsi,2nd Edition,tata Mcgraw Hill
5. Electronic Instrumentation and Measurements Bell PHI

Paper 4- Power Electronics, Information Theory and Coding

1. Student should be allowed to use Non Programmable Scientific Calculator in Examination hall

Unit I- Thyristors,Controlled Rectifiers and Commutation Techniques

Thyristors – Thyristor Characteristics, Two transistor model of Thyristor, Turn ON and Turn OFF of Thyristor, di/dt protection, dv/dt protection, Type of Thyristors, Series operation and Parallel operation of Thyristors, Thyristor Firing Circuits, Unijunction Transistor. Controlled Rectifiers – Single Phase semiconverter with RL load, Single Phase full converter with RL load .

Thyristor Commutation Techniques – Natural Commutation, Forced Commutation, Self Commutation, Complementary Commutation, External Pulse Commutation,

Unit II- AC Voltage Controllers, DC Choppers and Inverters

AC Voltage Controllers –Introduction, Principle of ON-OFF control, Principle of Phase control, Single Phase bi-directional controllers with inductive loads, Cycloconverters.

C Choppers – Principle of operation, Classification of Choppers – Class A, Class B, Class C, Class D and Class E Choppers.

Inverters-Introduction, classification of Invertors, Single phase, full bridge Voltage source inverter with RL load,

Unit III- Power Drives- DC Motor and AC Motor

DC Motor – Basic Characteristics, Speed control of DC motors – Armature voltage, Armature Resistance and Field flux controls, Solid state speed control of DC motor – Single Phase half wave converter, Single phase full wave converter.

AC Motor (Induction Motor) – Construction & Principle, Speed control of Induction motor – Stator voltage, Stator frequency, Pole changing, Rotor resistance and Slip power recovery control, Basic Construction and principle of Stepper motor

Unit IV – Power conditioners:

EMI/ RFI filters, CVT, Voltage regulators, Solid state regulators, UPS online & OFF line, reliability of UPS system. Batteries used for UPS, Important terms related to the UPS System & comparison of UPS system.

Applications of Power Electronics: Electronic ballast, Power factor correction, Induction heating, Dielectric heating.

Unit V – Information Theory :Introduction, Unit of Information, Entropy, Rate of Information, Joint Entropy and Conditional Entropy, Mutual Information, Channel Capacity, Shannon's Theorem, Continuous Channel, Capacity of a Gaussian Channel: Shannon Hartley Theorem, Bandwidth S/N Trade-off.

Coding – Introduction, Coding Efficiency, Shannon-Fano Coding, Huffman Coding, Error-Control Coding, Block Codes, Convolution Codes.

Compression Concepts: Lossy, Loseless and Encryption

TEXT BOOKS

1. Power Electronics - Muhammad H. Rashid, Prentice Hall of India, Second Edition, New Delhi
2. Power Electronics - A.K. Gupta & L.N. Singh, Dhanpat Rai Publishing Company, 1st Edition.
3. Power Electronics - J. Asger, PHI Publication.
4. Communication System - R.P.Singh & S.D. Sapre TMH Analog and Digital
5. Power Electronics R.M. Jalnekar & N.B. Pasalkar
6. Pspice Simulation Of Power Electronic Circuits: Raymond Ramshaw
7. Spice for Power Electronics and Electric Power Muhammad H. Rashid, Prentice Hall of India,
8. Communication Systems, Simon Haykin, John Wiley & sons, NY, 4th Edition
9. Information theory : F.M Reza, McGraw Hill

PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR
SYLLABUS PRESCRIBED FOR THE EXAMINATION OF
M. Sc. Electronics
Semester-4
(Jan-June 2016)

Paper 1 -Digital Signal Processing

1. Student should be allowed to use Non Programmable Scientific Calculator in examination hall.

Unit I- Discrete Time Signals, Systems and Z-Transform

Discrete Time Signals, Systems-An introduction to analog signal processing, Discrete time signals & systems- discrete time signals (sequences), Linear shift, Invariant systems, Stability & Casuality, linear constant coefficient Differential equations, Frequency domain representation of discrete time systems & signals, Sampling of continuous time signals.

Z-Transform- Introduction, Z-transforms (of finite length sequences, Right sided, left sided & two sided sequences) Inverse Z-transform, Z-transform theorems & properties – Region of convergence of rational Z-transform, Linearity, Shift of a sequence, multiplication by an exponential sequence, Initial value theorem, Convolution of sequences, system functions.

Unit II-Discrete Fourier Transform

Discrete time fourier transform (DTFT), Representation of periodic sequence - Discrete Fourier series(DFS), Properties of the Discrete Fourier series- Linearity, Shift of a sequence, symmetry properties, periodic convolution; Fourier representation of finite duration sequences- The Discrete Fourier transform(DFT), Properties of discrete Fourier transform - Linearity, Circular shift of a sequence, Symmetry Properties, Circular convolution, Linear Convolution using the Discrete Fourier Transform.

Unit III- Fast Fourier Transform and Network Structures

Fast Fourier Transform (FFT), Inverse DFT, Radix FFT.

Signal Flow Graph Representation of Digital Network, Matrix Representation of digital Networks. Basic network structures for IIR systems (Direct form, cascaded form, and parallel form) Transposed forms, Basic network structures for FIR systems (direct form, cascaded form).

Unit IV- Digital IIR filter

Digital filter design techniques- design of IIR digital filters from analog filters, impulse invariance, Bilinear transformation, Design examples: Analog-Digital Transformation –

Digital Butterworth Filters (impulse invariance, bilinear transformation), Digital Chebyshev filters (impulse invariance, bilinear transformation), Comparison of IIR and FIR Digital Filters.

Unit V- Digital FIR filter

Finite impulse response (FIR) Filter Design, Rectangular, Triangular, Hanning, Hamming, Blackman and Kaiser window. Linear phase and Optimal filter.

TEXT BOOKS

1. Digital Signal Processing - A.V. Oppenheim & Schafer. PHI
2. Discrete Time Signal Processing - A.V. Oppenheim & Schafer. PHI
3. Digital Signal Processing - Johny Jonson, Pearson PHI
4. Digital Signal Processing - Proakis
5. Digital Signal Processing -Vallavaraj, Salivahanan, Ghanapriya, THM

Paper 2-Optical and Satellite Communication

1. Student should be allowed to use Non Programmable Scientific Calculator in examination hall.

Unit I-Optical Fibers

Optical fiber theory and applications, advantages and disadvantages, parameters and types of optical fibers, Propagation of light through optical fiber ,single mode step index fiber, multimode step index fibers, multimode graded index fibers, Comparison of Three types of Optical fibers, Acceptance angle and acceptance cone, Numerical Aperture, , construction of optical fiber cables,

Transmission Characteristics of Optical Fiber: Attenuation in Optical Fibers, loss mechanisms - absorption and Rayleigh scattering, Radiation losses, Wavelength dispersion , intermodal and intramodal ,Bending losses, Coupling losses: misalignment and mismatch losses,

Unit II- Principle of Optical Communication

Optical Fiber Communication System Block Diagram

Optical sources: Heterojunction LED, Edge emitting LEDs, Injection Laser LEDs

Light Detectors: PIN Diode and Avalanche Photodiode, Structure of In GaAs APDs Characteristics of Light Detectors, Connector types and splices, Optical Fiber System Link Budget, Optical fiber manufacturing processes. Optical fiber testing and parameter (cut off wavelength, loss per unit length, numerical aperture, bending loss, connector/splice loss) measurement.

Unit III- Optical Fiber Communication Systems and Applications

Typical Fiber Optic Communication System, Optical Transmitter, Optical Receiver, Optical Repeaters, Optical Amplifiers, semiconductor optical amplifiers, EDFA, Raman Amplifier. Basic idea of WDM and DWDM systems. System Architecture: Point to point link,

Distributed Network, AN Fiber Optic Sensors in Health care, Optical Computing, Optical Logic Gates

Unit IV-Satellite Communication - I

Satellite Communication – Introduction. Kepler’s laws. orbit. Power systems. Satellite Frequency Allocations and Band Spectrum, Elements of a Satellite Communication System, Active and Passive Satellites, Modem and Codec, Communication Satellite Link Design – General Link Design Equations, Effective Isolated Radiated Power (EIRP), System Noise Temperature, C/N and G/T ratio, Atmospheric and Ionosphere Effects on Link Design, Uplink Design, Complete Link Design, Interference Effects on complete link design, Earth Station parameters.

Unit V- Satellite Communication - II

Satellite orbits – synchronous orbit, orbital parameters, Satellite location with respect to the earth, Look Angles, Earth coverage and Slant range. Satellite Transponder model, Satellite RF Front End, Satellite Carrier Processing, Antenna – Antenna parameters, Gain, Resistance, Bandwidth, Beamwidth and polarization, Parabolic antenna. Application of Satellite Communication in Television - Direct Home Broadcast, Telephone services and Data Communication.

TEXT BOOKS

- 1.Optical Fiber Communication -G. Keiser, Mc. Graw Hill
- 2.Fiber Optics Communication -D. C. Agrawal
- 3.Satellite Communication -D.C. Agrawal, Khanna Pub.
- 4.Satellite Communication -R.M. Gagliardi
5. Fundamentals of Optical Fibre Communication: Satish Kumar PHI
6. Optical fibre and Laser Anuradha De New Age International Publishers
7. Optical Fiber Communication : V.S.Bagad Technical Publications
8. Optical Fiber Communications?, John Senior: PHI.
- 9 Electronic communication, Roddy and Coolen, PHI, New Delhi,

Paper 3- Automatic Control System and Artificial Neural Network

- 1. Student should be allowed to use Non Programmable Scientific Calculator in examination hall.**
- 2. Special graph paper viz. Polar graph & Semi log graph papers should be provided to the students in the examination hall.**

Unit I - Fundamental of Control System

Basic Definition, Classification of Control System, Open Loop & Closed loops System, Effect of feedback on System response, Impulse Response & Transfer Function, Block diagram,

Block Diagram Reduction Techniques. Signal Flow Graph-Basic Definition in SFG, Rule for SFG, Properties of SFG, Masons Gain Formula.

Unit II -Time Domain analysis and Stability of Linear Control System

Time Response of Continuous Data system, test Signal ,Steady State Errors and error constants, Unit Step response, Time Domain specifications, time Response of first order System, Transient Response of Prototype second order System, effect of adding a zero to the system. Stability of Linear Control System-Absolute Stability, Relative Stability, Routh-Hurwitz Criterion-Ruth Tabulation, Special Cases.

Unit III- Frequency Domain Analysis and Frequency Response Plots

Frequency Domain Analysis - Frequency Response of closed loop control System, Frequency Domain Specifications of prototype Second Order System, Nyquist Stability Criterion and plot, Root Loci- basic properties, Relative Stability-Gain Margin & Phase Margin, Correlation Between Time & Frequency response, Polar Plot, Bode Plot.

Unit IV-State Variable Analysis and Controllers

State Variable Analysis and Design – Concept of state variables, state model, state model for linear continuous time system, diagonalization, solution of state equations, concept of controllability and observability, PID Controller.

Unit V- Artificial Neural Network

Introduction to ANS Technology-Models of a neuron, neural networks, viewed as directed graph, feedback from neurons to ANS, **Learning and training**- Hebbian, memory based, competitive, error-correction and learning. **Assignment problem** supervised and unsupervised learning. **Network architectures-Single layered**- feed forward networks, multi-layered feed forward networks, Activation and Synaptic Dynamic. **Stability and convergence**- single layered perception - least mean square algorithm, multilayered perceptions - backpropagation algorithm.

TEXT BOOKS

1. Control systems Theory & Application - Samarajit Ghosh (Pearson Edu)
2. Control System Engineering - B.C.Kuo(PHI)
3. Control Systems Engineering - I.J. Nagrath, M. Gopal
4. Artificial Neural networks - B. Yagna Narayan
5. Neural Computing -Philips D. Wasserman
Theory and practice -Vannostrand Reinhold

Paper 4 – Embedded System and Microcontroller

1. Student should be allowed to use Non Programmable Scientific Calculator in Examination hall.

Unit I- Introduction to Embedded systems:

Introduction, Application Areas, Categories of embedded systems, Overview of embedded systems architecture, Specialties of embedded systems, challenges and issues in embedded

software development Recent Trends, hardware architecture, Software architecture, Application software, Communication Software, core platform development, boot sequence, development/testing tools.

UNIT – II

Introduction to Microcontrollers – Microprocessors and Microcontrollers - Introduction to Intel 8051/8751/8031 Microcontrollers – Architecture, Internal diagram, Data memory, Interrupt Structure, I/O ports, Timer / counters, Serial ports and Registers, Addressing modes.

Interfacing of Peripherals with 8051 Microcontroller - Interfacing of EPROM's, RAM's, PPI 8255, Programmable Interval Timer -8253/54, Display/Key Board Controller - 8279, interfacing of 8 bit A/D and D/A converters.

Unit III

Instruction set, 8051 assembly language programming , internal structure of 8051, power resetting, built up RAM and ROM, I/O Programming and Addressing modes.

Applications of 80C51 Microcontrollers - Interfacing of LCD Modules, Stepper Motors. System Design with 89C51 to monitor frequency, voltage, displacement, Temperature, speed, traffic light control system with s/W development.

UNIT – IV

Counter and time details, counter and timer programming using 8051, interrupt programming, types of interrupt. Asynchronous serial communication, data programming, RS232 standard, RS422 standard, 1488 and 1489 standard, GPIB, max 232 driver, serial communication programming.

Unit V

PIC Microcontrollers – Introduction to PIC 16C6x/7x family microcontrollers, Architecture, Registers, Register File Structure, Addressing Modes, Instruction set. Interrupt Structure, Timers, Counters, I/O Port Concepts, Peripheral Interfacing and Applications.

Features of RISC architectures, CISC and RISC architecture comparison, advantages of RISC, Power saving methods.

TEXT BOOKS

1.8051 Programming, Interfacing and Applications -K.J. Ayala, Penram Pub

2.8051 Microcontroller and Embedded systems -Muhammad Ali Mazidi & Janice

Gillispie mazidi

3. Embedded systems - Raj Kamal, TMH

4. Embedded/Real Time Systems – Dr.K.V.K.K.Prasad, dreamtech Press.

5. Design with PIC Microcontrollers – John B.Peatman, Pearson Education Asia

6. PIC Microcontrollers: An Introduction to Microelectronics, Martin P. Bates, Elsevier.

BOOK FOR REFERENCE:

1. Intel Embedded Microcontrollers and Processors Vol. I

**LAB COURSE “A”- ANALOG ELECTRONICS LAB
M.Sc. Electronics
July-Dec 2014
Semester I**

1. To study the Astable and Monostable Multivibrator using IC741.
2. To study the RC Phase Shift Oscillator by determining its frequency of oscillation and compare calculated and observed frequency.
3. To study the Schmitt Trigger using transistor and IC7413 by observing the output waveform.
4. To study the Colpitt Oscillator, determine its frequency of oscillation and compare the calculated and observed frequency.
5. To study the Negative Feedback Amplifier by measuring closed loop gain and gain bandwidth product.
6. Verification of following network theorems (1) Superposition (2) Thevenin`s (3) Norton`s theorem.
7. To study and plot the MOSFET characteristics.
8. To study the Active Band pass filter and calculate its (1) Bandwidth: - Lower cutoff & upper cutoff frequency. (2) Quality factor.
9. Construct a Wein Bridge Oscillator and determine its frequency of oscillation and compare calculated and observed frequency.
10. To study the Active Low pass filter and to evaluate: -
(1) Cutoff frequency, (2) Band pass gain, and (3) Plot the frequency response.

11. To study the Clipping circuits as positive and negative logic.
12. To study the Clamping circuits as positive and negative logic.
13. To Study the phototransistor characteristics.
14. To study the comparison of Schmitt trigger and phototransistor.
15. Verification of the Maximum Power Transfer theorem.
16. To study the characteristics of JFET (Junction field effect transistor) in common source configuration & evaluate— 1. AC drain resistance, 2. Amplification factor and 3.Drain Resistance.
17. To study the operation of Class B Amplifier.
18. To study the Z parameter of a passive Two Port Network.
19. To study the Op – Amp as voltage to current converter.
20. To study of characteristics of NPN transistor in common emitter configuration and evaluate— 1. Input resistance, 2. Output resistance, and 3.Current gain.
21. To study the Active High pass filter and to evaluate:--
(1) Low cutoff frequency, (2) Band pass gain, and (3) Plot the frequency response.

Any other experiment of equal standard relevant to syllabus can also be set.

Note: -Students have to perform at least 15 experiments from the above list.

Reference Books

- 1 .Laboratory Experiments and PSPICE Simulations in Analog Electronics Maheshwari & Anand **PHI**
- 2 Laboratory Manual for Operational Amplifiers and Linear ICs, 2nd ed. Bell **PHI**
3. Student Reference Manual for Electronics Instrumentation Lab Wolf & Smith **PHI**
4. ELECTRONIC LAB PRIMER By B. Sasikala, S. Poorna Chandra S.Chand Pub

LAB COURSE “B”- DIGITAL ELECTRONICS LAB
M.Sc. Electronics
July -Dec 2014
Semester I

List of Experiments: -

1. Verify the following Boolean expressions--
i) $A + A'B = A + B$ ii) $AB + AB' = A$

iii) $AB + A'C + BC = AB + A'C$ iv) $AB + A'C = (A + C)(A' + B)$.

2. To study the operation of 4 bit binary full adder and subtractor (IC 7483) having input and output carry bits. Add and subtract any two binary numbers of four bits.
3. To study the characteristics of C-MOS integrated circuits, verify the operation of C-MOS inverter/NAND gate ICs and study the voltage level of C-MOS for proper ON/OFF (logic 1 or 0) condition.
4. To study the interfacing of C-MOS to TTL IC's and vice-versa. Different TTL logic gates and C-MOS logic gates with pull up resistance are provided for interfacing.
5. To study the master slave J-K flip-flop and verify truth table.
6. To study R-S/D/T flip-flops using NAND ICs and verify truth table.
7. To study the operation of shift register as serial in parallel and parallel in serial mode.
8. To study the operation of shift register as parallel in parallel and serial in serial mode.
9. To study write/read operation of digital data into semiconductor memory using IC 7489. Store and retrieve some set of data. (RAM)
10. To study the operation and application of a modern LSI D/A converter. Parallel binary inputs from switches are applied to DAC, which in turn converts the binary number into a proportional output voltage.
11. To study the operation of modulo-n-counter as MOD 3 & MOD 4 and verify the truth table.
12. To study the operation of modulo-n-counter as MOD 8 & MOD 9 and verify the truth table.
13. To study the operation of a Presettable Divide by N Counter and verify its truth table.
14. To study the operation of Multiplexer IC having 16: 1 channels.
15. To study the operation of Demultiplexer IC having 1:16 channels and 4 select inputs.
16. To study the operation of BCD Up-Down Counter.
17. To study the operation of Memory programming with seven segment display.
18. To study the operation of comparison of JK flip-flops and verify the difference with timing diagram.

Any other experiment of equal standard relevant to syllabus can also be set.

Note: -Students have to perform at least 15 experiments from the above list.

Books:

- 1.Laboratory Manual for Operational Amplifiers and Linear ICs, 2nd ed. **Bell PHI**
- 2.Student Reference Manual for Electronics Instrumentation Lab Wolf & Smith **PHI**

LAB COURSE “C”- ANALOG AND DIGITAL COMMUNICATION LAB
M.Sc Electronics
Jan-June 2015
Semester II

List of Experiments: -

Analog Communication

1. To study the operation of balanced modulator DSBSC using IC 1496.
2. To study the phase modulation using IC 2206 and calculate the modulation index.
3. To study amplitude modulation and demodulation and construct an AM generator and a diode detector and observe its operations under various conditions.
4. To demonstrate (i) use of 4046 PLL as an FM modulator. (ii) Use of 4046 PLL IC as an FM demodulator.
5. To study the characteristics and testing methods of T attenuators.
6. To study the Carrier Wave (CW) operation of Klystron tube and determine its operating frequency.
7. To study the Square Wave operation of Klystron tube and determine its operating frequency.
8. To study the modes of Klystron tube.
9. To determine the frequency and wavelength of rectangular waveguide, working on TE₁₀ mode.
10. To determine the standing wave ratio (SWR) of Klystron tube.
11. To determine the Reflection Coefficient of Klystron tube.

Digital communication-

1. Study of signal sampling and reconstruction techniques and to verify Nyquist criteria and tracing.

2. Study of PAM, PWM and PPM modulation and demodulation techniques.
 3. Study of TDM pulse amplitude modulation and demodulation.
 4. Study of pulse code modulation and demodulation techniques.
 5. Study of delta and adaptive-delta modulation methods.
 6. Study of Phase Shift Keying Modulation and Demodulation Technique.
 7. Study of Amplitude Shift Keying Modulation and Demodulation Technique.
 8. Study of Frequency Division Multiplexing and Demultiplexing
- Any other experiment of equal standard relevant to syllabus can also be set.

Note: -Students have to perform at least 10 experiments from the above list.

Books: Laboratory Experiments and PSPICE Simulations in Analog Electronics Maheshwari & Anand PHI

LAB COURSE “D”- 8085 MICROPROCESSOR PROGRAMMING, STUDY CARDS AND INTERFACING LAB

**M.Sc Electronics
Jan-June 2015
Semester II**

List of Experiments:-

1. Program of 8085 to add 8-bit numbers from memory & display result to C060H memory location & carry in C061 H.
2. Program of 8085 of 8085 to transfer the data of 16 consecutive locations into other 16 consecutive locations in forward order and vice versa.
3. Program of 8085 to search the memory location that contained 05 H data in a string of length of 16 byte and display it to memory location to C060 H.
4. Program of 8085 to search number of 05 H data in a string of length of 16 byte and display it to memory location to C060 H.
5. Program of 8085 to multiply two 8-bit numbers.
6. Program of 8085 to divide two 8-bit numbers.
7. Program of 8085 to solve a Boolean Equation which rep. Combinational logic as follows:-

$$X= A' (B+C). D' + A.B. (D+C), A.B.C. \& D \text{ are four independent variables.}$$

8. Program of 8085 to convert BCD into its equivalent binary number.
9. Program of 8085 to convert Binary number into its equivalent unpacked BCD number.
10. Program of 8085 to count the number of Zeros, positive and negative number in a series of 16 bytes.
11. Program of 8085 to convert Binary number into its equivalent ASCII number.
12. Program of 8085 to convert ASCII into its equivalent binary number.
13. Program of 8085 to find the largest and smallest number in a data array.
14. Program of 8085 to arrange the data array in ascending and descending order.
15. Program of 8085 to add a series of data of 16 consecutive memory location and display the result in C060 H and carry in C061 H memory location using subroutine.
16. Program of 8085 to subtract two 8-bit data from memory location using 2's complement method and display the result in C060 H and borrow in C061 H.

Note: -Students have to perform at least 15 Programs of 8085 from the above list.

*** STUDY OF 8255 CARD ***

1. Program 8255 in mode-0; i.e. simple I/O mode Program Port-A, Port-B, Port-C in O/P mode, transmit data from keyboard to all the ports.
2. Repeat program no.(1), with all ports in I/P mode. Store data to M.P.U.'s registers.
3. Program 8255 in B.S.R. mode. Set port-C in O/P mode Using appropriate delay set/reset PC.
4. Program 8255 in mode-1; i.e. strobe I/O mode Program Port-A, Port-B is in mode-1 and Port-A is in O/P mode and Port-B is in I/P mode and Port-C is used in control signal.
5. Program 8255 in mode 0 i.e. simple I/O mode. Program Port A in I/P mode and Port B in output mode.
6. Program 8255 in mode 0 i.e. simple I/O mode/ Program Port B in I/P mode and Port A in output mode.
7. Program 8255 in mode 0 i.e. simple I/O mode. Program Port A in I/P mode, Port B in input mode. Read data from Port A&B, add it & display

*** STUDY OF 8253 CARD ***

8. Program 8253 in mode-0 i.e. interrupt on terminal count. Select counter c; Read/load lower 8-bits & then higher bits. Draw and explain the function of Gate, Out & Clock signals.
9. Program 8253 in mode 1. Draw and explain the function of GATE, OUT and CLOCK Signals.
10. Program 8253 in mode 2. Draw and explain the function of GATE OUT and CLOCK Signals.
11. Program 8253 in mode 3 to generate square wave. Draw and explain the function of GATE, OUT and CLOCK Signals.

*** STUDY OF LBDR CARD ***

12. Study of Buffer IC-74L8245 on L.B.D.R. Card using 8085 M.P.U. kit.
13. Study of Latch IC-74L8245 on L.B.D.R. Card using 8085 M.P.U. kit.
14. Study of LBDR as 2 & 4 decoder.
15. To access memory locations (RAM) specified by generation control signals on L.B.D.R. card using 8085 M.P.U.

*** STUDY OF 8259 CARD ***

16. Study of master 8259 in stand-alone mode. Generate and interrupt request-using 8259 and display the respective interrupt in address field.
17. Study of 8259 in cascaded mode i.e. in 8259 as master and the other as slave. Generate an interrupt request using 8259 and display the respective interrupt in address field.

*** STUDY OF 8251 CARD ***

18. Interface 8251 with 8085 M.P.U. and program it in asynchronous transmitter mode, use 8251 Group A.
19. Interface 8251 with 8085 M.P.U. and program it in asynchronous receiver mode, use 8251 Group A.
20. Interface 8251 with 8085 M.P.U. and program it in synchronous transmitter mode, use 8251 Group A.
21. Interface 8251 with 8085 M.P.U. and program 8251 Group A is in synchronous transmitter mode and 8251 B is in synchronous receiver mode.

***STUDY OF 8237/57 CARD ***

22. Interface 8237 IC with 8085 M.P.U. memory to I/O transfer (Read Mode)
23. Interface 8237 IC with 8085 M.P.U. and Study memory to I/O transfer in block transfer mode (write mode).
24. Interface 8237 IC with 8085 M.P.U. and study I/O to memory transfer in single transfer mode (write mode)
25. Interface 8237 IC with 8085 M.P.U. and study I/O to memory transfer. In this mode data stored at 4150H to 415AH

**Note: -Students have to perform at least 5 Study Cards from the above list.
PIO Card**

***STUDY OF DAC CARDS ***

26. Program to demonstrate DAC as positive going staircase (or ramp) generator.
27. Program to demonstrate DAC as triangular wave generator.
28. Program to demonstrate DAC as exponential binary staircase generator.
29. Program to demonstrate DAC as R-C charging and discharging waveform.

***STUDY OF DYNA THUMBWHEEL CARDS ***

30. To study interfacing of Thumbwheel with microprocessor based system as Dyna-85.

Approved by Board of Studies in Electronics on 14th February, 2011

***STUDY OF SERIAL DISPLAY INTERFACE CARDS ***

31. To study interfacing of Serial Display Interface Card with microprocessor based system as Dyna-85.

Note: -Students have to perform at least 2 PIO Cards from the above list

Any other experiment of equal standard relevant to syllabus can also be set.

LAB COURSE “E”-OPTO ELECTRONICS, TRANSDUCER AND INSTRUMENTATION LAB

M.Sc Electronics

July-Dec 2015

Semester III

List of Experiments:-

Opto Electronics

1. To study the operation of an Opto-coupler IC-4 N 26.
2. To study the Phototransistor characteristics.
3. To study the comparison of a Schmitt trigger and Phototransistor.
4. To study the similarities and differences between conventional LEDs and fiber optic LEDs.

Transducer control system Trainer kit

1. To study the characteristics of a 3 wire RTD and to observe the change in resistance as temperature increases. (Wheatstone bridge).
2. To study the application of 2 wire RTD in a potentiometer circuit.
3. To study the application of 3 wires RTD in a Wheatstone bridge circuit.
4. To study the characteristics of thermocouple and observe the change in output voltage with the change in temperature.
5. To study semiconductor diode as a temperature sensor.
6. To study transistor as a temperature sensor.
7. To study the application of thermistor in a DC wheatstones bridge circuit.
8. To study the application of thermistor in a non - inverting Op – Amp circuit.

Thyristor Application trainer

- 1.To study & plot the SCR characteristics.

2. To study & plot the UJT characteristics.
3. To study & plot the DIAC characteristics.
4. To study & plot the TRIAC characteristics.

Virtual Instrumentation Using National Instrument LabView Software

1. Design a Virtual Instrument of Half adder digital circuit using LabView.
2. Design a Virtual Instrument of Full adder digital circuit using LabView.
3. Design a Virtual Instrument of Half subtractor digital circuit using LabView.
4. Design a Virtual Instrument of Full subtractor digital circuit using LabView.
5. Design a Virtual Instrument. to find maximum & minimum amplitude of given waveform using LabView.
6. Design a Virtual Instrument to convert Analog waveform to Digital waveform using LabView.
7. Design a Virtual Instrument to generate multitone waveform (sine & square) using LabView.
8. Design a Virtual Instrument to convert Celcius into equivalent Fahrenheit using LabView.

LAB Course “F”- 8086 MICROPROCESSOR PROGRAMMING INTERFACING AND “C” PROGRAMMING LAB

**M.Sc Electronics
July-Dec 2015
Semester III**

List of Experiments:-

8086 ASSEMBLY LANGUAGE PROGRAMMING

1. Write a program to transfer an 8-bit data from register to C060H memory location.
2. Write a program to transfer an 16-bit data from register to C060H memory location.
3. Write a program to add two 8-bit data and result is stored in C060H.
4. Write a program to add two 16-bit data and result is stored in C060H.

5. Write a program to subtract two 8-bit data and result is stored in C060H.
6. Write a program to subtract two 16-bit data and result is stored in C060H.
7. Write a program to multiply two 8-bit data and result is stored in C060H.
8. Write a program to multiply two 16-bit data and result is stored in C060H.
9. Write a program to divide 16-bit data by 8-bit and result is stored in C060H.
10. Write a program to divide 32-bit data by 16-bit and result is stored in C060H.

*** STUDY OF 8255 CARD ***

Study the Interfacing of 8255 Study card with 8086 Microprocessor.

*** STUDY OF 8259 CARD ***

Study the Interfacing of 8259 Study card with 8086 Microprocessor.

List of C Programming

1. Write a program to calculate the roots of quadratic equation $Ax^2+Bx+C=0$.
2. Write a program to calculate the average of a set of n numbers including zero and negative numbers.
3. Write a program to sort an array element in ascending order using bubble sort technique.
4. Write a program to sort an array element in descending order using bubble sort technique.
5. Write a program to plot a $\sin(X)$.
6. Write a program to read and print a single dimension array A and B each having 10 elements write a program that prints out an array C having elements, which are sum of the elements of array A and B.
7. Write a program to find a row sum and column sum of a given matrix and built a new matrix with the help of row sum and column sum and previous matrix.
8. Write a program to read and print two-dimensional matrix of order $n \times m$. Find the sum of diagonals.
9. Write a program that calculate and prints out the maximum and minimum of array.
10. Write a program for sorting names in alphabetical order.
11. Write a program to plot and exponential series.

12. Write a program to print the terms in the exponential series, till the term is equal to 0.00001 also compute the exponential series of x,

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots + 0.00001.$$
 13. Write a program for matrix multiplication.
 14. Write a program for matrix addition.
 15. Write a program for the operation of (a) addition (b) subtraction (c) multiplication (d) division. Using switch command.
 16. Write a program to find the factorial of a given number and Fibonacci series using switch command.
 17. Write a program to find the sum of natural numbers using function
- Any other experiment of equal standard relevant to syllabus can also be set

LAB COURSE "G"- OPTICAL COMMUNICATION AND 8051 PROGRAMMING LAB

**M.Sc Electronics
Jan-June 2016
Semester IV**

List of Experiments: -

Fiber Optics Communication kit.

1. Study of setting up a fiber Optic Analog Link.
2. Study of setting up a fiber Optic Digital Link.
3. Study of Losses in Optical Fiber.
4. Measurement of Numerical aperture of a optical fiber.
5. Study of Manchester Coding & Decoding of optical signal.
6. Study of Time Division Demultiplexing through fiber optic link –B .
7. Measurement of Bit Error Rate of an optical signal through fiber optic link -B.
8. Study of Eye Pattern of fiber through fiber optic ling –B.
9. Forming PC to PC Communication Link using Optical Fiber & RS-232Interface.

8051 Programming: -

Any 10 Basic programming in 8051 Microcontroller.

General Programming Practical of 8051

1. Write a program to find the addition of two 8- Bit Numbers.
2. Write a Program to subtract Two 8 – Bit Numbers.
3. Write a Program to find Multiplication of Two 8- Bit Numbers.
4. Write a Program to find Division of Two 8- Bit Numbers.
5. Write a Program to find the Factorial of a given numbers.
6. Write a Program to transfer the Data block in Forward order.
7. Write a Program to transfer Data Block in Reverse order.
8. Write a Program to find Addition of Series of numbers.
9. Write a program for searching no. of (05H) in a given Memory Location.
10. Write a Program to find out no. of Even & Odd no. in a given Data Series.
11. Write a Program to count Zero, Positive, Negative no. in a given Data Series.
12. Write a program to count the numbers which are divisible by 3 in a given Data Series.
13. Write a Program to find the largest number in a given Data Series.
14. Write a Program to find the smallest number in a given Data Series.
15. Write a Program to arrange the Data in ascending order.
16. Write a Program to arrange the Data in descending order.
17. Write a program to convert Binary Number to BCD Number.
18. Write a program to convert Binary Number to ASCII Number

Interfacing Practical of 8051

1. To Study & Analyze the Interfacing of 16×2 LCD.
2. To Study & Analyze the Interfacing of 5×7 LED Matrix.
3. To Study & Analyze the Interfacing of Seven Segment Display.
4. To Study & Analyze the Interfacing of ADC & DAC Module.
5. To Study & Analyze the Interfacing of DC Motor .
6. To Study & Analyze the Interfacing of Stepper Motor.
7. To Study & Analyze the Interfacing of LEDs.

Any other experiment of equal standard relevant to syllabus can also be set.

Project

This course provides quality education to students on professional grounds. Apart from classroom lectures and Practical's, the students are also required to undertake a project in the fourth semester. This provides them with an opportunity to interact with the industry. Seminars are organized where eminent professionals from various organizations are invited.

Execution and documentation of a project on a specific topic with one of the following aspects

- Part of ongoing research projects in the department
- Developmental work related to industry requirements
- State of the art new technological studies
- Theoretical and experimental studies
- Development of prototypes in the finished product form
- Technical Writing and Project Documentation
- Presentation and Appreciation.

Seminar

Each student shall present a seminar in the Fourth semester on a topic relevant to Electronics for about 30 minutes. The topic should not be a replica of what is contained in the syllabus. The topic shall be approved by the Seminar Evaluation Committee of the Department. The committee shall evaluate the presentation of students. A seminar report in the prescribed form shall be submitted to the department after the approval from the committee.

The topics of current relevance covering following aspects should be chosen

- Collection of reference material
- Assimilation of concepts and preparing document
- Communication skills
- Presentation styles and use of projection aids
- Appraisal and evaluation of delivered seminars

