RANI DURGAVATI VISHVAVIDHYALAYA, JABALPUR
DEPARTMENT OF POST GRADUATE STUDIES AND RESEARCH IN PHYSICS AND ELECTRONICS
M. Sc. Electronics Semester I & II (With Effect from 2016-17)
Choice Based Credit System (CBCS)

(In accordance with the University Ordinance No.222)
SEMESTER – I

Theory Courses		Marking Scheme					
Paper Code	Title of Paper	Credits	End Sem. Exam.	Continuous Evaluation			Total
ELE C 101	Core Electromagnetic Fields and Waves	5	60	40			100
ELE C102	Core Properties of Electronics Materials	5	60	40			100
ELE C103	Core Signals and Systems	5	60	40			100
ELE EL104 ELE EL105	Elective (Any one) A.Computational Methods in Electronics B. Digital Design and Applications	5	60	40			100
Ability enhancement & Skill Development (Practical Courses)				Practical Record. & Viva	Seminar Related to Practical	Total	
ELE L 106 Lab A		3	60	20	20	40	100
ELE L 107 Lab B		3	60	20	20	40	100
Total		26	360	240			600

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DEPARTMENT OF POST GRADUATE STUDIES AND RESEARCH IN PHYSICS AND ELECTRONICS
M. Sc. Electronics (With Effect from 2016-17)
Choice Based Credit System (CBCS)
(In accordance with the University Ordinance No.222)

SEMESTER – II

Theory Courses		Marking Scheme					
Paper Code	Title of Paper	Credits	End Sem. Exam.	Continuous Evaluation			Total
ELE C 201	Core Analog and Digital Circuits	5	60	40			100
ELE C 202	Core Optical and Quantum Electronics	5	60	40			100
ELE C 203	Core Network Analysis and Synthesis	5	60	40			100
ELE EL 204 ELE EL 205	Elective (Any one) A. Microprocessor and Object Oriented Programming B. Microwave Electronics	5	60	40			100
Ability enhancement & Skill Development (Practical Courses)				Practical Record. & Viva	Seminar Related to Practical	Total	
ELE L206 Lab A		3	60	20	20	40	100
ELE L 207 Lab B		3	60	20	20	40	100
Total		26	360	240			600

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RANI DURGAVATI VISHVAVIDHYALAYA, JABALPUR
DEPARTMENT OF POST GRADUATE STUDIES AND RESEARCH IN PHYSICS AND ELECTRONICS
M. Sc. Electronics Semester III & IV (With Effect from (2017-18)
Choice Based Credit System (CBCS)
(In accordance with the University Ordinance No.222)
SEMESTER – III

Theory Courses		Marking Scheme					
Paper Code	Title of Paper	Credits	End Sem. Exam.	Continuous Evaluation			Total
ELE C 301	Core Integrated Circuit technology	5	60	40			100
ELE C 302	Core Microwave and Digital Communication	5	60	40			100
ELE C 303	Core Control Systems	5	60	40			100
ELE EL 304 ELE EL 305	Elective (Any one) A. Electronics Instrumentation and Measurement B. VHDL	5	60	40			100
Ability enhancement & Skill Development (Practical Courses)				Practical Record & Viva	Seminar Related to Practical	Total	
ELE L 306 Lab A		3	60	20	20	40	100
ELE L 307 Lab B		3	60	20	20	40	100
Total		26	360	240			600

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RANI DURGAVATI VISHVAVIDHYALAYA, JABALPUR
DEPARTMENT OF POST GRADUATE STUDIES AND RESEARCH IN PHYSICS AND ELECTRONICS
M. Sc. Electronics (With Effect from (2017-18)
Choice Based Credit System (CBCS)
(In accordance with the University Ordinance No.222)
SEMESTER – IV

Theory Courses		Marking Scheme					
Paper Code	Title of Paper	Credits	End Sem. Exam.	Continuous Evaluation .			Total
ELE C 401	Microcontroller and Embedded Systems	5	60	40			100
ELE C 402	Cellular and Satellite Systems	5	60	40			100
ELE C 403	Digital Signal Processing	5	60	40			100
ELE EL 404 ELE EL 405	Special/Elective (Any One) a) Internet and Web Technology and Management b) Nano-electronics	5	60	40			100
Ability enhancement & Skill Development (Practical Courses)				Practical Record & Viva	Seminar Related to Practical	Total	
ELE L 406 Lab A		3	60	20	20	40	100
ELE PW 407 Project Work		3	60 (Report + Presentation.)	40			100
ELE IT 408Industrial Training & Skill Development		4	60 (Report +Presentation)	40			
Total		30	420	280			700

M. Sc. Electronics I Semester 2016 onwards (CBCS)

M.Sc. Electronics (I Semester) Syllabus 5 Credits

ELE C 101

Core Paper 1: Electromagnetic Fields and Waves 60+40= 100 Marks

UNIT I

Electrostatic Fields:- The Experimental Law of Coulomb, Electric field Intensity , field due to a continuous Volume Charge Distribution , Field of a line Charge , Field of Sheet Charge , Streamline and Sketches of Fields. Electric Flux Density, Gauss's Law, and Application of Gauss's Law: Some Symmetrical Charge Distributions, Differential Volume Element. Divergence, point form of Gauss law, the vector Operator V and the Divergence Theorem,

UNIT II

Boundary Value Problems in Electrostatics:- Conductor properties and and boundary conditions Poisson's and Laplace's Equations, Uniqueness Theorem, Example of Solution of Laplace's Equations, Example of Solution of Poisson's Equation , Product Solution of Laplace's Equation , Method of electrostatic images for point charge and charged sphere near grounded and insulated conducting sheets, Biot-Savart Law , Ampere's Circuital Law , Curl , Stokes theorem , Magnetic Flux and Magnetic Flux Density , The Scalar and Vector Magnetic Potentials. Multipole expansion,

UNIT III

Time- Varying Fields and Maxwell's Equations and The Uniform Plane Wave:-Faraday's Law**,** Displacement Current , Maxwell Equation in Point form , Maxwell Equation in Integral Form, Potentials of electromagnetic field, Gauge transformation, Coulomb Gauge, Lorentz Gauge , Retarded potentials, Wave Motion in Free Space , Wave Motion in Perfect Dielectrics , Plane wave in lossy dielectric, The Poynting Vector and Power Considerations , Propagation in Good Conductor: Skin Effect, Reflection of uniform plane waves, Standing Wave Ratio.

UNIT IV

Transmission Lines and Electromagnetic Radiations:- The transmission line equation, Transmission line parameters, Some transmission line examples, Graphical methods, Some practical problems. Radiations from oscillating dipole, Linear antenna, Lienard wiechert potentials, field of charge particle in uniform motion and arbitrary motion. Fields of an accelerated charge, Radiation from accelerated charged particles at low velocity, Angular distribution of power radiation, Electric quadrupole radiation.

UNIT V

Relativistic Electrodynamics:- Review of four vector and Lorentz transformation, Invariance of electric charge, relativistic transformation properties of E and H fields, Electromagnetic fields tensor in 4-dimensional Maxwell equation, Four vector current and potential and their invariance under Lorentz transformation, Covariance of electrodynamics, Lagrangian and Hamiltonian for relativistic charged particles in electromagnetic fields, uniform and non-uniform E and B fields.

Text/Reference Books

1. Engineering electromagnetic By William H. Hayt
2. Electrodynamics by Satyaprakash
3. Electrodynanmics by Gupta and Kumar
4. Electromagnetics by B.B.Laud
5. Classical Electrodynamics by J.D.Jackson
6. Electrodynamics by Chopra and Agrawal

M.Sc. Electronics (I Semester) (CBCS) 5 Credits

ELE C 102

Core Paper 2: Properties of Electronic Materials 60+40= 100 Marks

UNIT I

Electrical and Dielectric Properties:- Electrical properties: of metals: Conductivity, reflection and absorption, Fermi surfaces, Thermo electric phenomena. Conduction in metals oxides, amorphous materials. Dielectric Properties of materials: Macroscopic electric field, local electric field at an atom, dielectric constant and polarizability, Ferro electricity, anti ferro electricity, phase transition, piezoelectricity, Ferro elasticity, electrostriction.

UNIT II

Optical Properties:- Optical properties of materials: Optical constants and their physical significance, Kramers – Kronig Relations, Electronic inter bond and intra bond transitions Relations between Optical properties and band structure, colour of material (Frenkel Excitons), photoluminescence, Electroluminescence. Properties of nano materials.

UNIT III

Magnetic Properties of Materials: Langevin Theory of Dimagnetism and paramagnetism, various contributions to para and dia magnetism, Adiabatic demagnetization, Paramagnetic susceptibility, Ferromagnetism, ferrimagnetism, ferrites, antiferromagnetism, Magnetic Domains.

UNIT IV

Semiconductors:- Direct and indirect band gap methods to determine the forbidden gap electronic and hole transport in semiconductors, electrical parameters, carrier concentration, mobility, temperature dependence, experimental methods to study the electrical parameters, thermo electric effect. Hall effect, intrinsic and extrinsic semiconductors, electrons and phonons in semiconductors.

UNIT V

Semiconductor Devices:- Field Effect transistors : JFET, MOSFET, ideal MOS capacitor, control of threshold voltage, surface field effect transistors, Id-Vds characteristics, practical device effects. Negative conductance devices – IMPATT, TRAPATT, Gunn diode, masers Power Devices : p-n-p-n diode, Semiconductor Controlled Rectifier Quantum well structures.

Text/Reference Books:

1. Solid State Physics Dekkar
2. Introduction to Solid State Physics C.Kittle
3. Solid State Physics Ashcroft, Mermin
4. Principles of Electronic materials & Devices S.O. Kasap
5. Physics of Semiconductor Devices S.M. Sze

M.Sc. Electronics (I Semester) (CBCS) 5 Credits

ELE C 103

Core Paper 3: Signals and Systems 60+40= 100 Marks

UNIT I

Signal and System modeling concepts:- Introduction, Examples of systems, Signal models (examples of deterministic signals, continuous-time vs discrete –time signals, periodic and aperiodic signals, phaser signals and spectra, singularities functions, unit impulse function (delta function)) ,Energy and power signals, Energy and power spectral densities.

System modeling concepts : terminology, representation of systems, properties of systems (continuous-time and discrete –time systems, fixed and time-varying systems, causal and noncausal systems, dynamic and instantaneous systems, linear and nonlinear systems). The superposition integral for fixed linear systems. Examples illustrating evaluation of the convolution integral. Impulse response of a fixed linear system. Superposition integral in terms of step response, Stability of linear systems, System modeling and simulation.

UNIT II

Fourier Series and Transforms:- Introduction, Obtaining trigonometric Fourier series representations for periodic signals, spectral form of the trigonometric Fourier series, The exponential Fourier series, Symmetry properties of the Fourier coefficients, Parseval's theorem, line spectra, Transfer function of a fixed linear system, distortionless systems, Frequency groups, Fourier series and signal spaces.

Fourier Transform : The Fourier integral, energy spectral density, Fourier transform in the limit, Fourier transform theorems related to: linearity, time delay, scale change, time reversal, duality, frequency translation, modulation, differentiation, integration, convolution, multiplication. Table of Fourier transform pairs,F.T. of dc and ac pulses,System analysis with Fourier transform, Steady state system response to sinusoidal inputs by means of Fourier transform, Ideal filters, Window functions and Gibbs phenomenon, Rate of convergence of spectra, Fourier transform of periodic signals. General idea of Hilbert transform and its applications.

UNIT III

Laplace Transform : Introduction, examples of evaluating Laplace transforms, Laplace transform theorems related to :- linearity, transform of derivatives , transform of integrals, s-shift theorem, delay (t-shift) theorem, Laplace transform of convolution of two signals, Laplace transform of a product of two signals, initial value theorem, final value theorem, scaling theorem. Inversion of rational functions. The inversion integral and its use in obtaining inverse Laplace transforms.

Network analysis using Laplace transform: Laplace transformed equivalent circuit elements, mutual inductance, network theorems (Thevenin's and Norton's) in terms of Laplace transform, Loop and Node analysis of circuits by means of the Laplace transform

UNIT IV

Transfer function and frequency response of systems: general concepts of a transfer function, properties of transfer function for linear lumped stable systems, frequency response, zero-input and zero state response, asymptotic and marginal stability.

Stable and unstable systems and concept of stability, Routh-Hurwitz criterion ,Routh array, Bode plots, Block diagrams , Block diagrams and their reduction.Operational amplifiers as elements in feedback circuits.

State – variable techniques : State-variable concepts, Form of state equations, Time-domain solutions of state equations, concept of state transition matrix, Frequency-domain solutions of state equations, Finding the state transition matrix, State equations for electrical networks, State equations from transfer functions, State equations for discrete –time systems.

UNIT V

Discrete – time signals and systems: Introduction, Analog –to-digital conversion (sampling, sampling theorem, Impulse train sampling, Data reconstruction, quantization and encoding,), The z – transform (definition, linearity, Initial value and final value theorems, inverse z-transform, Delay operator), Difference equations and discrete- time systems (properties of systems, shift invariant systems, causal and noncausal systems, linear systems, difference equations, steady state frequency response of a linear discrete –time system, frequency response at f=0 and f=0.5fs), Example of a discrete –time system, Inverse z-transformation by the inversion integral.

Text/Reference Books

1. Signals and Systems: Continuous and discrete, by Rodger E. Ziemer, William H.Tranter and D. Ronald Fannin, second edition,, Maxwell Macmillan nternational Edition (1990).
2. Sihnals and systems by Simon Haykin and Barry Van Veen second edition, John Wiley and sons (2003)
3. Signals and systems by Samarajit Ghosh, Pearson education (2006)

M .Sc. Electronics (I Semester) (CBCS) 5 Credits

Any one to be opted amongst the following Elective papers :

ELE EL 104

Elective Paper 4(a): Computational Methods in Electronics

60+40= 100 Marks

UNIT-I

High level computer language and Operating systems: Operating system: Familiarities with various operating systems like DOS, OSII, GUI, Like Windows, Unix/Linux. Detail of one Operating system such as UNIX - Introduction multitasking, multiuser capabilities, UNIX bacis, files and Directories, understanding the UNIX shell, text processing in UNIX environment, editor like VI, EMAC, SED.

UINT-II

Programming: Elementary idea about Digital computer principles, Compilers, Interpreters, and Operating system. BASIC Programming, Flow Charts, integer and floating point, arithmetic expressions build in function, executable and non-executable statements, assignments and functions, operation with files, Graphics statements, Methods of determination of zero's of linear and nonlinear algebraic equations and transcendental equations convergence of solutions.

UNIT-III

Solution of simultaneous linear equations, Gaussion elimination, pivoting, iterative method matrix inversion, Eigen values and Eigen vectors of matrices, power and Jocobi method, finite differences, interpolation with equally speeds points, Curve fitting polynomials least squares and least spline fittings.

UNIT – IV

Numerical differentiation and integration Newton cotes formulae, Error estimates Gauss method. Numerical solution of ordinary differential equation. Euler and Ranga- kutta Methods. Predictor and corrector method. Elementary ideas of solution of partial differential equation.

UNIT-V

Computer application to problems in electronics:

i. Study of oscillations in LC, RC and LCR circuits.
ii. Study of Fourier analysis by using analytical expressions for Fourier series and Fourier transformations of periodic function, Harmonic wave, DC pulse and AC pulse.
iii. Study of charging and discharging in circuit with inductor, capacitors and registers.
iv. Acceleration of charge particle in cyclotron.

Text/ Reference Books

1. Introductory Methods of Numerical analysis by Sastry
2. Numerical Analysis by Rajaraman
3. Numerical Analysis by Balagurswamy
4. Numerical Reciper Uttermind Tenkolsky Press Flattery
5. Computational Physics by R.C.Verma, P.K.Ahluwalia and K,C.Sharma New Age Publishers 1999

M.Sc. Electronics (I Semester) (CBCS) 5 Credits

ELE EL 105

Elective Paper Paper 4(b): Digital Design and Applications

60+40= 100 Marks

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,

Logic families- RTL, DTL, TTL, ECL interfacing , ECL and TTL, Speed of operation, power dissipation , figure of merit, fan in, fan out, noise margin..

MOS logic MOSFET NAND and NOR gates, CMOS inverters, CMOS - NAND and NOR gates, interfacing CMOS and TTL, inter facing CMOS and ECL, comparison of logic families.

Unit-II Logic Design

Minimization of Boolean functions, Karnaugh Map and Applications, Analysis and Synthesis of combinational circuit

Simplification of boolean algebra using K-map, minterm and maxterm, design of binary adder, substractor , digital comparator, parity generator/checkers, priority encoder, BCD to 7 segments decoder,

Unit III. **Combinational logic circuits**: arithmetic circuits – Half adders, Full adders; Digital Comparators, Encoders, Decoders, multiplexer, multiplexer tree, demultiplexer and demultiplexer tree.

Unit IV Sequential Circuit Design - I

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. Different types of Counters: Ripple Counter, Asynchronous and Synchronous Counters, UP/Down Counters, Modulo (MOD) Counters.

Unit V Sequential Circuit Design-II

Shift Registers: Serial in ,Serial out, Parallel in Serial out Shift Registers, Parallel in Parallel out Shift registers, Bi directional Shift Registers, Shift register counters, Shift Register Application, Application of Counters. Introduction to Synchronous sequential Machines.

Refereed Books :

1. Digital Design III rd edition : M. Morris Mano**. (TEXT)**
2. Z. Kohavi (TMH), “Switching & Finite Automata Theroy”.
3.Digital and Analogue Techniques-G.N.Navneeth,V.M.Gokhale,R.G.Kale(Kitab Mahal)
4. Digital Fundamentals-Floyd& Jain,Pearson Education.
5. Digital Computer Electronics-Malvino (Tata McGraw Hill)
6. Integrated Circuits- K.R.Botkar (Khanna Publishers)

M.Sc. Electronics II Semester 2016 onwards (CBCS)

M.Sc. Electronics (II Semester) 5 Credits

ELE C 201

Core Paper 1: Analog and Digital Circuits 60+40= 100Marks

UNIT I

Operational Amplifier – Differential amplifier and its DC & AC analysis, block diagram of OP-AMP , its parameters, frequency response , current mirror and current loading biasing ,concept of ideal op-amp , specification of standard op-amp like IC 741,LM 324,μA 741.

UNIT II

Linear application of OP-AMP: - voltage amplifier, summing amplifier, averaging amplifier, current source, differential amplifier, instrumentation amplifier, filters: LPF, HPF, BPF and all pass filter.

UNIT III

Non linear application of OP–AMP: - active diode circuits –rectifiers, peak detector, clipper and clamper, comparator: - Zero crossing detectors, limit detectors, window comparator and Schmitt triggers. Differentiator, Integrator, Waveform Generator and conversion using op-amp oscillators.

UNIT IV

Minimization of Boolean functions, Karnaugh Map and Applications, Analysis and Synthesis of combinational circuit, Digital Comparators, MUX and DMUX, Encoders, Decoders, Code Converters.

UNIT V

Different types of Counters and Registers. Introduction of Synchronous Sequential Machines, Digital Voltmeter, Digital frequency counter; Realization of Flow table from verbal description, Sequence Detector, Mealy and Moore model Machines, State Table and Transition diagram.

Text/Reference Books :

1. Digital Principal and application : Malvino and Leach.
2. Electronics Principle: A.P. Malvino
3. Digital Design III rd edition : M. Morris Mano**. (**TEXT)
4. Z. Kohavi (TMH), “Switching & Finite Automata Theroy”.
5. Integrated Circiuts, K.R.Botkar
6. Operational Amplifiers, Gackwad

M.Sc. Electronics (II Semester) (CBCS) 5 Credits

ELE C 202

Core Paper 2: Optical and Quantum Electronics 60+40= 100Marks

UNIT I

Photoconductivity and Photodetectors:- General mechanism of photoconductivity, Simple model of photoconductor, homogeneous and non-homogeneous photoconductors, photoresisters. Types of photodetectors and their applications, General principle, p-n photodiode, Optocouplers, Optointerruptors Impulse and frequency response of p-i-n photodiode avalanche photodiode, phototransistors and photomultipliers tubes.

UNIT II

Luminescence and LEDs:- Spectrum of recombination radiation, mechanism of luminescence, types of luminescence, configuration co-ordinate curve model and energy band model, rise and decay of luminescence, acceleration –colision electroluminescence, cathodoluminescence, television phosphors. working principle of LEDs and their applications, behaviour at high frequency, double hetrerostructure LEDs, their properties, LED lighting, Display devices, indicators, numeric, alphanumeric and special function displays, Liquid Crystal Display elements, Plasma Displays, Multimedia projectors.

UNIT III

Photovoltaic effect, Basic Principles Solar cell characteristics and parameters, spectral response, solar cell fabrication technology Photovoltaic modules and array, Applications.

Electro-Optic Effect: Kerr effect, Pockels effect, Faraday effect, Electro-Optic

Modulator

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

Magneto-Optic Effect: Faradays effect, magneto-optic modulator.

UNIT IV

Quantum electronics: Basic principle of lasers, threshold condition, laser rate equations for two, three and four level laser systems, Modes of rectangular cavity, open plane resonator, mode locking and Q switching of lasers, Rubi laser, He-Ne laser, CO_2 laser, Semiconductor lasers, condition for amplification, optical gain and threshold current density for lasing in SC lasers.

UNIT V

Application of lasers: Laser in manufacturing, laser cutting of material, laser marking, laser transmitter, measurement of distance through Laser. Lasers used in safety interlocks, power isolators, rotary and linear encoders and remote control. Fiber optic sensors. Digital camera and automatic inspection systems, Introduction to Optical computing and holography. Nonlinear optics: second and third order nonlinearity, second harmonic generation

Text/ Reference Books

1. Optoelectronics by Willson and hawkes
2. Optical Electronics By Ghatak anf TyagRajan
3. Semicondutor Opto Electronics Devices By P. Bhattcharya
4. Solid State Physics By Dekkar
5. Photoconductivity By Bube
6. Essentials of Solar Cell By Kotnala and Singh
7. Optical Communication System By Johan Gowar
8. Lasers and non linear optics By B. B. Laud

M. Sc. Electronics (II Semester) (CBCS) 5 Credits

ELE C 203

Core Paper 3: Network Analysis and Synthesis 60+40= 100Marks

UNIT I

Mesh and Node Analysis and Network Theorems:- Mesh and Node Analysis - Kirchoff'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, cotrees, 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-relationship11 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/Reference 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.

M. Sc. Electronics (II Semester) (CBCS) 5 Credits

Any one to be opted amongst the following Elective papers:

ELE EL 204

Elective Paper 4(a): Microprocessor and Object Oriented Programming

60+40= 100Marks

UNIT I

8085 Microprocessor: - Microprocessor and its architecture and its operation , Memory interfacing , Addressing Modes ,Memory Mapped I/O , Introduction to 8085/8080A Instructions , Data Transfer Operation , Arithmetic Operation , Logic Operations, Branch Operation , Writing Assembly Language programs , Debugging a Program , Interrupts , Timing Diagram and instruction execution in 8085.

UNIT II

Interfacing I/O Devices: - Basic interfacing concept , Interfacing output Displays , Interfacing Input Devices, Intel 8212 I/O port , Programmable Peripheral Interface Intel 8255 , Programmable Interrupt Controller Intel 8259A , Direct Memory Access (DMA) and 8257 DMA Controller. D/A Converter and A/D Converter.

UNIT III

8086 Microprocessor :- Pin Description , Operation Modes , Minimum Modes and Maximum Modes, Registers of Intel 8086 , Internal Architecture of 8088/8086 Microprocessor , Software Model of the 8088/8086 Microprocessor , Segment Register and Memory Segmentation , Data Registers , Pointer and Index Registers , Status Register , The Stack , Input/output Address Space , Addressing Modes of the 8088/8086.

UNIT IV

8088/8086 Microprocessor Programming: - The Instruction set of the 8088/8086 , Data Transfer Instruction , Arithmetic Instructions , Logic Instructions , Shift Instructions , Rotate Instructions , Flag Control instructions Compare Instruction , Jump Instructions , Subroutines and Subroutine – Handling Instructions , The Loop and Loop Handling Instructions , Strings and String-Handling Instructions.

UNIT V

Object Oriented Programming (C++):-Introduction to C++ and object oriented programming , compiling and linking the source code **,** Identifier and Keywords , Data Types , Constant , Variables and Arrays , Structures , Nested Structures , Classes and Objects , Data Hiding and Encapsulation , Constructers and Destructors , Function Overloading , Inheritance , Pointers and Arrays , Stack and Queues , Link List , Standard libraries and bit manipulation.

Text/Reference Books

1. Microprocessor Architecture Programming and Application By Ramesh S. Gaonkar
2. The 8088 and 8086microprocessor By Avatar Singh
3. Fundamental of microprocessor and microcomputer By B. Ram
4. Object oriented programming (C++) By Balaguruswami

M. Sc. Electronics (II Semester) (CBCS) 5 Credits
Any one to be opted amongst the following Elective papers:
ELE EL 205
Elective Paper 4(b): Microwave Electronics

60+40= 100Marks

UNIT l:

Introduction, definition of microwave, characteristic features, application of microwave Generation of microwave by vacuum tube - limitation of conventional tubes klytron amplifier-reflex klystron oscillator, magnetrons-traveling wave tubes

UNIT 2:

Generation of microwave by solid state devices, bipolar transistor field effect transistors, gunn oscillator, avlanche diode, oscillator, IMPATT & TRPATT mode of operation parametric amplifiers.

UNIT 3:

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 mics, microwave monolithic integrated circuits (MMIC'S).

UNIT 4:

Waveguide and waveguide component, concept of waveguide, advantage of hollow wave guide, reflection from a metal surface, field pattern obtained by oblique reflection, higher order modes, waveguide dimensions, impedance matching elements, waveguide short circuit, tees and magic tee, phase shiftless, attenuators, matched terminators, waveguide slotted section, PIN diodes, PIN diode switches

UNIT 5:

Microwave measurement techniques, standing wave measurements, impedance measurement, cavity resonator, cavity σ. frequency measurements and calibration techniques, dielectric measurments.

Recommended Books:

l. Microwave Devices and Circuits- S. Y. LIAO, PHI
2. Introduction to Microwave Theory and Measurments -L.A. LANCE, TMH
3. Radio Frequecy and Microwave Electronics, M.M. RADMANESH, PEARSON
4. Taub's Principal of Communication System- Taub Schilling-Saha (Oxford)
5.Electronics Communication System-Kennedy,Daves, McGraw Hill.

M. Sc. Electronics I Semester 2016 onwards (CBCS)

ELE L 106

Practical Courses Lab A 3 Credits 60+ 40 = 100 Marks

The following experiments to be performed by the students. (Similar experiments of equal standard may be added)

List of Experiments:

1. Mean variance, standard deviation, correlation coefficient and equations of lines of regression for a bivariate data.
2. Solution of simultaneous linear algebra equations by Gauss elimination method.
3. Solution of simultaneous linear algebra equations by Gauss iteration method.
4. Solution of simultaneous first order differential equations by Runge Kutta method.
5. Evaluation of an integral by Gaussian quadrate.
6. Solution of Laplace equation.

ELE L 107

Practical Courses Lab B 3 Credits 60+ 40 = 100 Marks

The following experiments to be performed by the students. (Similar experiments of equal standard may be added)

List of Experiments:

1. Determination of energy band gap of Germanium diode
2. Study of Hall Effect.
3. Study of sampling theorem.
4. Study of luminescence properties of materials
5. Study of JFET – characteristics and its applications using Multisim software.
6. MOSFET - characteristics using Multisim Software.
7. Design of simple circuits using Multisim Software.
8. Design of simple amplifier by using Multisim Software and study of biasing.

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M.Sc. Electronics II Semester 2016 onwards (CBCS)

ELE L 206

Practical Courses Lab A 3 Credits 60+ 40 = 100 Marks

The following experiments to be performed by the students. (Similar experiments of equal standard may be added)

List of Experiments:

1. Study of characteristics of LED.
2. Study of characteristics of photo-transistor.
3. Study of characteristics of light dependent resister (LDR).
4. Study of characteristics of solar cell.
5. Study of characteristics of diode LASER and determine the absorption coefficient of glass using diode LASER.
6. Study of characteristics of thermister.
7. Study of characteristics of optical fiber.

ELE L 207

Practical Courses Lab B 3 Credits 60+ 40 = 100 Marks

The following experiments to be performed by the students. (Similar experiments of equal standard may be added)

List of Experiments:

1. Design and study of Op-Amp based inverting and non-inverting amplifier with frequency response.
2. Design of low pass Butterworth filter (I & II order) using Op-Amp.
3. Design and study of four bit binary counter and its truth table using C.R.O. tracing
4. Assembly Language Programming of 8085 Part I – Sum, Difference, Compare etc.
5. Assembly Language Programming of 8085 Part II –
   (a) Smallest number of a series
   (b) Largest number of a series
   (c) Block transfer scheme
6. C^{++} based object oriented programming.

M.Sc. Electronics III Semester 2017 onwards(CBCS)

M.Sc. Electronics (III Semester) 5 Credits

ELE C 301

Core Paper 1: Integrated Circuit Technology 60+40= 100Marks

UNIT – I

Integrated Circuit Technology : Material purification. Epitaxial growth: LPE, VPE, MBE. Clean room specifications and requirements. Vacuum technology, sputtering, oxidation, growth mechanism and kinetics (thin and ultrathin oxides), oxidation techniques, redistribution of dopants at the interface and oxidation induced defects. Diffusion: Fick's law, diffusion mechanism, measurement techniques, diffusion in SiO_2.

UNIT II

Ion Implantation: systems and dose control, ion range, ion stopping, knock on ranges, metallization choices. Etching: dry etching, pattern transfer, plasma etching, sputter etching, control of etch rate and selectivity, control of edge profile. Process simulation and process integration. Lithography: optical, electron beam, ion beam, X-ray lithography, lift off, dip pen. Pattern generation. Fabrication of few devices like MMIC, laser diode etc.

Unit III- 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.

UNIT IV

Operational Amplifier, Characteristics and Applications

Basic operational amplifier, differential amplifier, transfer characteristics of differential amplifier, characteristics of ideal and practical operation amplifier, parameters of operational amplifier : error offset voltages and currents, universal balancing circuits, temperature drift of input offset voltages and currents, measurement of operational amplifier parameters, frequency response of
operational amplifier, Monolithic IC operational amplifiers, specifications, frequency compensation, slew rate and methods of improving slew rate.

UNIT V

Applications Of Operational Amplifiers ,Timer & PLL

Linear and Nonlinear Circuits using operational amplifiers and their analysis, Inverting and Non inverting Amplifiers, Differentiator, Integrator, Voltage to current converter, Instrumentation amplifier, Sine wave Oscillator, Low -pass and band pass filters, Comparator, Multivibrators and Schmitt trigger, Triangular wave generator, Log and Antilog amplifiers Block Diagram of Timer IC 555 ,Astable and Monostable Multivibrators using 555 Timer, Phase locked loops, phase detector, voltage controlled oscillator, effect of low pass filter on loop performance, PLL applications.

Text/References Books

1. VLSI Design by K.Lal Kishore etal, I.K.International Publishing House
2. VLSI DESIGN –S.M. Sze
3. VLSI TECHNOLOGY- Gandhi
4- Integrated Circuits : K. R. Botkar, Khanna Publishers New Delhi.
5. Designing with op-amps and Analog and Digital IC's – S. Francio, MC Graw Hill.