VEER NARMAD SOUTH GUJARAT UNIVERSITY,
DEPARTMENT OF PHYSICS
SURAT- 395 007 (GUJARAT)
Revised Syllabus (Effective from June-2010)

M.Sc. (ELECTRONICS)
Structure for Semester I

FIRST SEMESTER:

Course No.	Title	Theory / Lab. Hours per week			External Exam.	Internal Marks	Total Marks
		Theory	Tutorial	Total Hours	Marks		
EL-411	Mathematical Methods	04	01	05	70	30	100
EL-412	Microcontroller	04	01	05	70	30	100
EL-413	Measurement	04	01	05	70	30	100
EL-414	C and CAD for Electronics	04	01	05	70	30	100
EL-415	Practicals	09	01	10	140	60	200

Practicals : 14 to 16 practicals in each semester will be given in the Laboratory Work.

DISTRIBUTION OF INTERNAL MARKS :

For each Theory Papers :	Weightage of Marks
1. One Unit Test per Semester	20
2. One Tutorial Test per Paper Per Semester	05
3. One Assignment per Paper Per Semester	05
Total	30

For each Practical Course :	Weightage of Marks
1. One Practical Test per Semester	40
2. Assessment of Journal Per Semester	20
Total	60

M.Sc. (Electronics) : Semester - I

EL-411: Mathematical Methods

Unit - 1 :

Ordinary Differential Equations:

Solution in closed form, power series solution, miscellaneous approximate methods, the W K B method.

Unit - 2 :

Integral Transforms:

Fourier transforms, Laplace transforms, other transform pairs, applications of integral transforms.

Unit - 3 :

Special Functions:

Legendre functions, Beseel functions, hypergeometric functions, confluent hypergeometric functions. Hermite functions, spherical harmonics, Lagaurre's functions.

Unit - 4 :

Partial Differential Equations:

Examples, general discussion, separation of variables, integral transform method.

Evaluation of Integrals:

Review of residue theorem, contour integration and evaluation of definite integrals, conformal mapping.

Unit - 5 :

Numerical Methods:

Finite differences, difference tables, interpolation, roots of equations.

Probability Distributions:

Binomial, poison and Gaussian distribution, properties of distributions, fitting of experimental data.

Unit - 6 :

Group Theory:

Introduction to groups and group representations, definitions, sub-group and classes, group representation, characters, physical applications, infinite groups, SU(2), SU(3).

Recommended Books

1. J. Mathew & R.L. Walker, Mathematical Methods of Physics Benjamin (IBH) 1979.
2. H. Margenau and G.M. Murphy, Mathematics of Physics and Chemistry, East-West Press, 1975.
3. P.M. Morse and H. Feshbach, Methods of Theoretical Physics, Vols.1-2, McGraw Hill-Kogekusha, 1953.
4. V.M. Trivedi, Ganitiya, Bhautikshashtra, Vol.3, Univ. Book Production Board, Ahmedabad, 1974.
5. D.D. Desai, Ganitiya Bhautikshashtra, Vol.2, Univ. Book Production Board, Ahmedabad, 1978.
6. R.V. Churchill, Complex Variables and Applications, McGraw Hill, 1960.
7. Mathematical Physics, B.S. Rajput Pragati Prakashan, 1997.

Theory Tutorials (EL-411)

(These are problem solving and discussion sessions. Concepts in theory and related aspects can be discussed).

1. Applications of series solution method
2. Application of W.K.B. method
3. Problems of method of separation of variables for PDE.
4. Problems of hypergeometric and confluent hypergeometric functions.
5. Addition theorem of spherical harmonics
6. Residue theorem applications
7. Contour integration
8. Evaluation of definite integrals using contour integration.
9. Problems on numerical methods
10. Problems on distributions
11. Constructing character tables
12. Representation theory of groups
13. S U (2), S U (3) – applications.

M.Sc. (Electronics) : Semester – I

EL- 412 :Microcontrollers

Unit-1

Architecture:

The 8051 Architecture: 8051 microcontroller hardware, I/O pins ports and circuits, External memory, Counters and timers, Serial data I/O, Interrupts

Unit-2

Data transfer:

Moving Data: Addressing modes, External data moves, Code memory read-only data moves, Push and pop op-codes, Data exchanges, simple programs of data transfer operations

Unit-3

Logical Operations:

Logical operation: Byte-level logical operations, bit-level logic operations, rotate ans swap operations, simple programs of byte-level and bit-level operations

Unit-4

Arithmetical operation:

Arithmetic operation: instructions affecting flags, Incrementing and decrementing, Addition, Subtraction, Multiplication and division, Decimal arithmetic simple programs of arithmetic operations

Unit-5

Branch and control

Jump and Call Instruction: The jump and call program range, Jumps, Calls and subroutines, Interrupts and returns, simple programs explaining jump and call instructions

Unit-6

System design

An 8051 Microcontroller system design: Microcontroller specifications, Microcontroller design, Testing the design, Timing subroutine, Lookup tables for the 8051 microcontroller, Serial data communication.

Recommended Books

1. Kenneth J. Ayeala, The 8051 microcontroller, Architecture, programming and application, Penram International Publishing (I) Pvt.Ltd.
2. M.A.Mazidi, J.G.Mazidi, Rolin D. McKinlay The 8051 Microcontroller and Embedded systems. Pearson Prentice Hall.
3. Satish Shah, Embedded system design using The 8051 Microcontroller, Bension Education

Theory Tutorials (EL- 412)

1. Integrated Development Environment (IDE) for embedded system development.
2. System development tools.
3. Assembly language program for embedded systems.
4. C-language program for embedded systems.
5. Interfacing Keyboard.
6. Interfacing of LED and its assembly language programming.
7. Interfacing of intelligent LCD and its assembly language programming.
8. I/O related assembly language programming.

M.Sc.- (Electronics) : Semester - I

EL-413: Measurement

Unit-I :

Measurement :

Aims of measurement, experimental planning, Types of experiment Design Factors, Experiment Design Protocol and examples. Report writing some General comments, Types of Reports, Contents of a Report.

Unit-2 :

Signal Conditioning and Conversion :

Introduction, Transducer Bridges, Instrumentation Amplifiers, A.C. Amplifiers, D.C. Amplifier, Change Amplifiers, Analog to Digital Conversion, Digital to Analog Conversion, Voltage to frequency and frequency to voltage converters, Interference, Grounding, Screens and Shielding.

Unit-3 :

Pressure measurement :

Pressure measurement - Introduction, Mechanical Pressure-measurement Devices, Bourdon Tube, Diaphragm and Bellows Gages, Low pressure measurement, The McLeod Gage, Pirani Thermal conductivity Gage, Knudsen Gage, Ionization Gage, Alphatron.

Unit-4 :

Temperature measurement & other Physical Quantity :

Temperature measurement -Introduction, Temperature Scales, Temperature measurement by Mechanical Effect, Temperature measurement by Electrical Effect, Temperature measurement by Radiation. Thermocouple compensation, Thermal conductivity measurement, Measurement of Viscosity, Humidity measurement, pH measurement.

Unit-5 :

Strain Measurement :

Stress and strain - Strain Measurement, Electrical Resistance Strain Gages, Measurement of Resistance Strain-Gage outputs, Temperature compensation, strain gage Rosettes. The unbounded Resistance strain Gage.

Unit-6 :

Solar Radiation Measurement Counter :

Data transmission and Telemetry- Introduction Modulation and Encoding method overview, Transmission media, Bandwidth and Noise Restrictions.

Recommended Books:

1. J.P. Holman, Experimental Methods for Engineers, Tata-McGraw Hill
2. E.O. Deoblien, Measurement - An Introduction, Tata McGraw Hill
3. Instrumentation, Measurement and Feedback, Barry G. Johnes, TMH

Theory Tutorials (EL-413)

1. Concepts of Measurement
2. Errors
3. Uncertainty Analysis
4. Chi-square test
5. Graphical Analysis
6. Proof Reader's Marks.

M.Sc. (Electronics) : Semester – I

EL- 414: C and CAD for electronics

Unit-1

Programming, higher level languages, operating systems, compiling programs, writing a program variables, data types and constants arithmetic expressions,

Unit-2

If statement, switch statement, flags, the conditional expression operator, the for statement, the while statement, the do statement, arguments and local variables, returning fraction results, functions calling top down programming, functions and arrays global variables, automatic and static variables, Recursive functions,.

Unit-3

Initializing array elements, characters arrays, multidimensional arrays, strings, functions and structures, initialize structures, arrays of structures, structures within structures, structures containing arrays, structure variables.

Unit-4

Pointers and structures, pointers and functions, pointers and arrays, operations on pointers, pointers to functions, pointers and memory addresses, bit operations, bit fields.

Characters I/O, get char and put char, formatted I/O printf and scanf, file I/O, special functions for handling files.

Unit-5

Fundamentals of CAD, introduction, design process, application of computers for design, creating the manufacturing the data base, benefits of CAD, examples, hardware in CAD, introduction, design work stations, the graphics terminal operator in out devices, plotters and other output devices, CPU, secondary storage.

Unit-6

Computer graphics software and database, introduction, software configuration of a graphic system, constructing the geometry, transformations, data base structure and content, wire frame versus solid modeling other CAD features.

Recommended Books:

1. S. G. Kochar, Programming in C, CBS Publication, 1991.
2. M. P. Groover and E.N. Zimmers Jr., Computer Aided Design and Manufacturing, PHI,
3. C. B. Besant, Computer Aided, Design and Manufacture, Ellis Horwood.
4. B. W. Kernighan and D.M. Ritchie, The C Programming Language, PHI.
5. Madhusudan Mothe, C for Beginners, Shroff Publisher and distributers Pvt. Ltd. 2009
6. The CAD/ CAM Handbook, Computer Vision Corp. 1980.

Theory Tutorials (EL- 414)

1. Writing program to understand different data types in C.
2. Writing program to understand sequential and selection control flow in C.
3. Writing program to understand Iteration control flow in C.
4. C-language program related to Array.

M.Sc.- (Electronics) : Semester - I

EL-415: Practicals

1. To design, build & test voltage regulator using IC -741.
2. To design, build & test Schmitt Trigger Circuit.
3. To design, build and test a Bistable multivibrator.
4. To design, build & test Half Adder & Subtractor using basic gates.
5. To design, build & test Binary to Gray Code Converter.
6. To design the basic RAM memory cell & its Conversion to 2x1 RAM.
7. Study of Characteristics of UJT, (ii) To design, build & test UJT as a relaxation oscillator.
8. To design, build & test Phase Shift Oscillator.
9. To design, build & test Astable Multi-vibrator.
10. To design, build & test Bistable Multi vibrator.
11. Study of Characteristics of FET.
12. To design, build & test 4-bit serial Input Parallel Output Left Shift Resistor using J K Flip-flops & its modification using D- Flip-flop.
13. To design, buid & test Digital to Analog Converter.
14. To design, build & test 4-bit Binary up counter.(ii) A module N-counter using J K flip-flops & other Gates.`

Recommended Books:

1. Ramakant A. Gayakwad,OP-AMPS & Linear Integrated Circuits : PHI.
2. David A. Bell, Solid State Pulse Circuit :, Reston Publishing Comp., Inc. Reston, Virginia.
3. Albert P. Malvino & Donald P.Leach, Digital Principles & Application : McGraw-Hill, International Editions.

Laboratory Tutorial (EL – 415)

1. Study of FM & PM Modulation.
2. Study of Double Sideband (DSB) & Single Sideband (SSB) amplitude Modulation.
3. Study of Water Level Measurement System.
4. Study of Pressure Measurement.
5. Study of Analog Signal Sampling & Reconstruction.

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Revised Syllabus (Effective from June-2010)

M.Sc. (ELECTRONICS)
Structure for Semester II

SECOND SEMESTER:

Course No.	Title	Theory / Lab. Hours per week			External Exam.	Internal Marks	Total Marks
		Theory	Tutorial	Total Hours	**Marks**		
EL-421	Quantum Mechanics	04	01	05	70	30	100
EL-422	Op-Amp & Circuit designing	04	01	05	70	30	100
EL-423	Electromagnetic fields and waves	04	01	05	70	30	100
EL-424	Electronic Communication-I	04	01	05	70	30	100
EL-425	Practicals	09	01	10	140	60	200

Practicals : 14 to 16 Practicals in each semester will be given in the Laboratory Work.

DISTRIBUTION OF INTERNAL MARKS:

For each Theory Papers :	Weightage age of Marks
1. One Unit Test per Semester	20
2. One Tutorial Test per Paper Per Semester	05
3. One Assignment per Paper Per Semester	05
Total	30

For each Practical Course :	Weightage age of Marks
1. One Practical Test per Semester	40
2. Assessment of Journal Per Semester	20
Total	60

M.Sc. (Electronics) : Semester- II

EL - 421 : Quantum Mechanics

Unit -1

The Schrödinger equation :

Inadequacy of old quantum theory, De Broglie hypothesis, Heisenberg uncertainty principle, The Schrödinger equation, Normalization and probability interpretation, Non normalizable wave functions and Box normalization, Conservation of probability, Expectation value; ehrenfest's Theorem, Admissibility Conditions on the wave function.

Unit -2

Stationary states and energy spectra :

Stationary states; Time Independent Schrödinger equation, A particle in a square well potential, Bound states in a square well (E<0), The square well; non localized states (E>0), The Schrödinger equation and the probability interpretation for an N particle system, The fundamental postulates of wave mechanics: Representation of states, Representation of dynamical variables; expectation values, observables.

Unit -3

General Formalism of wave mechanics:

The ad-joint of an operator and self ad-jointness, The eigen value problem; Degeneracy, Eigen values and eigen-functions of self ad-joint operators, The Dirac delta function, Observables; Completeness and normalization of eigen-functions, Closure, Physical interpretation of eigen values, eigen-functions anf expansion coefficients, Momentum eigen-functions; Wave functions in momentum space, The uncertainty principle, States with minimum value for uncertainty product, Commuting observables; removal of degeneracy.

Unit -4

Exactly soluble eigenvalue problems:

Evolution of system with time; Constants of the motion, Non-interacting and interacting systems, Systems of identical particles, exactly soluble eigenvalue problems: The simple harmonic oscillator, The Schrödinger equation and energy eigenvalues, The abstract operator method, The angular momentum operators, The eigenvalue equation for L^2; separation of variables, Admissibility conditions on solutions; Eigenvalues, The eigenfunctions; Spherical harmonics, Physical interpretation, parity.

Unit -5

Representations, Transformations and symmetries :

Quantum states; state vectors and wavefunctions, The Hilbert space of state vectors; Dirac Notation, Dynamical variables and linear operators, Abstract operators; The quantum condition, The adjoint; self adjointness, Eigenvalues and eigenvectors, Expansion of identity; Projection operators, Representation of state vectors, Dynamical variables as matrix operators. Product of operators. Self-adjointsness and Hermiticity, Continuous basis - The Schrodinger representation, Degeneracy; Labellingby commuting observables, Change of basis; Unitary transformations.

Unit -6

Approximation methods for stationary states:

Time independent Perturbation theory for discrete levels: Equations in various orders of perturbation theory, The non-degenerate case, The degenerate case- Removal of Degeneracy, The effect of an electric field on the energy levels of an atom (Stark effect), Two- electron atoms, The variation method : Upper bound on ground state energy, Application to excited states, Trial function linear in Variational parameters.

Recommended Books:

1. A text book of Quantum Mechanics, by P. M. Mathews and K. Venkatesan (TMH)
2. Quantum Mechanics, by L. I. Schiff (McGraw, Hill)
3. Quantum Mechanics, by A. K. Ghatak and S. Lokanathan (Macmillan -India)
4. Quantum Mechanics, by Powell and Crasemann
5. Quantum Mechanics, by Frnaz Schwabl
6. Quantum Mechanics Vol.I, by A. Messiah,(North Holand)
7. Quantum Mechanics, by E. Merzbacher (Willey)

Theory Tutorials (EL- 421)

1. Insignificance of de Broglie hypothesis in macrophysics,
2. General procedure to write down the Schrödinger equation for any system
3. Square potential barrier, quamtum mechanical tunnelling
4. Relations giving the values of the commutators
5. Schmidt orthogonalization procedure
6. Prove that momentum operator is self adjoint
7. Interpretation of hydrogen atom wave-functions
8. Problems in three dimensions : Anisotropic and Isotropic Oscillators
9. The algebra of rotation generators
10. Transformation of dynamical variables
11. Problems of non-degenerate and degenerate time-independent perturbation theory
12. Estimate the ground state energy of a two-electron atom using variational method.

M.Sc. (Electronics) : Semester – II

EL- 422 : Op-Amp. and Integrated circuit Designing

Unit-1

General linear applications

Peaking amplifier, Summing, scaling and averaging amplifiers, Instrumentation amplifier, Voltage-to-Current converter, Current-to-Voltage converter, Integrator, Differentiator.

Unit-2

Active filters

Butterworth low-pass filters, Butterworth high-pass filters, Band-pass filter, Band- reject filter, All-pass filter, simulation and design of analog filters (using SPICE).

Unit-3

Oscillators and Generators

Phase shift oscillator, Wein-bridge oscillator, Quadrature Oscillator, Voltage controller oscillator, Square wave generator, Triangular wave generator, Saw tooth wave generator.

Unit-4

Comparators and convertors

Basic comparators, Zero crossing detector, Schmitt trigger, comparator voltage limiters and window detector, Peak detector, F/V and V/F convertor, Clippers and clampers, Wien bridge oscillator, square, triangular ad saw tooth generators.

Unit-5

Specialized IC application-I

Timer IC 555 and its applications, IC 565 PLL and its applications, IC 78XX positive linear voltage regulators, IC 79XX negative linear voltage regulators.

Unit-6

Specialized IC application-II

LM 380 Power Amplifier, IC 8038 function generator, IC LM series adjustable voltage regulators, IC MC 1723 switching regulators, IC μA 78S40 switching regulators.

Recommended Books:

1. R.A. Gaikwad, Op. Amps and linear Integrated circuits PHI,
2. R.F. Conghlin and F.F. Orisoll, Op. Amp and Linear Integrated circuits, PHI.
3. S. Michale Jacab, Application and Design with Analog Integrated circuit.
4. Gray and Meyer, Analysis and Design of Analog ICS, John Wiley
5. S. Soelef, Applications of analog integrated circuits, PHI.
6. Laker and Sansen Analog Integrated circuits, McGraw Hill.

Theory Tutorials (EL- 422)

1. Computer simulation of Summing, scaling and averaging amplifiers
2. Computer simulation of active filters.
3. Computer simulation of oscillator.
4. Study of sample-and-hold circuit.
5. Study of A/D and D/A converter.

M.Sc. (Electronics) : Semester - II

EL-423: Electromagnetic fields and Waves

Unit – 1

Electrostatics:

Coulomb's Law, electric field, Gauss's law, scalar potential, Poisson's and Laplace's equations.

Boundary-Value Problems in Electrostatics:

Method of images, solutions of Laplace's equation in rectangular, spherical and Cylindrical co-ordinates, simple applications of Laplace's and Poisson's equations, uniqueness theorem about solution.

Unit – 2

Multipoles:

Multipole expansions of the potential of a charge distribution, simple dielectric and boundary conditions, electrostatic energy in dielectric medium, electrostatics for macroscopic media.

Unit – 3

Magnetostatics:

Biot-Savart law, Ampere's law, vector potential, magnetic multipoles, vector potential and magnetic induction for a circular current loop, magnetic moment, force and torque on and energy of a localized current distributions, boundary conditions in an internal magnetic induction, macroscopic equations, boundary conditions on **B** and **H**, methods of solving boundary value problems in magnetostatics, uniformly magnetized spheres, magnetic shielding.

Unit – 4

Maxwell Equations:

Maxwell's displacement current, Maxwell's equations, scalar and vector potentials, gauge transformations, Poynting's theorem, macroscopic equations.

Wave Propagation:

Plane waves in a non-conducting medium, polarization, superposition of waves in one dimension, group velocity, plane waves in conducting medium, skin depth.

Unit – 5

Wave Guides:

Rectangular wave guides, modes in rectangular wave guides.retarded potential.

Radiating Syaytems:

Lienard Wiechart potential, Larmour formula, radiation from antenna and antenna arrays.

Unit – 6

Plasma Physics And Magnetohydrodynamics

Introduction of plasma physics and magnetohydrodynamics, magneto-hydrodynamic equations, magnetic diffusion, viscosity and pressure, magnetohydrodynamic flow between boundaries with crossed electric and magnetic fields, pinch effect, instabilities in a pinched plasma column, magnetohydrodynamic waves, plasma oscillations, Debye screening. Applications of plasma physics and controlled thermonuclear reactions.

Recommended Books:

1. J.D. Jackson, Classical Electrodynamics, Wiley Eastern, 1975.
2. D J Griffiths, Introduction to electrodynamics 3rd Ed, Prentice Hall India, 1999
3. W.K.H. Panofsky and M. Philips, Classical Electricity and Magnetism, India Book Co., 1970.
4. E.C. Jordan and K.G. Balmain, Electromagnetic Waves and Radiating Systems, Prentice Hall, 1985.
5. J.B. Marion, Classical Electromagnetic Radiation, Academic Press, 1965.
6. F F Chen, Introduction to Plasma Physics and Controlled Fusion

Theory Tutorials (EL-423)

1. Calculation of charge density for a given potential function. Mean value theorem for electrostatic potential.
2. Problems on method of images.
3. Calculation of multi-pole moments of discrete and continuous charge configuration, Interaction energy of a nucleus in an external field.
4. Problems in magneto-statics.
5. Rotating metal disc in a uniform magnetic field. Problem on Hall Effect, magnetic held inside a coaxial tube.
6. Problem involving gauge other than Coulomb and Lorentz gauge.
7. Problem monopole and charge quantization.
8. Problem on Brewster angle, spreading of a wave propagating in a dispersive medium, problem on spherical wave.
9. Energy associated with the skin depth of a conductor, Radiation due to a cube with charge at alternate corners.

M.Sc.- (Electronics) : Semester - II

EL-424: Electronic Communication-I

Unit-1

Review of General communication system

Transmitter, Channel & Noise, Source, Receiver, Need for modulation, Bandwidth requirement, Spectral analysis, Sampling function, Response of a linear system, Normalized power in a Fourier expansion, Power spectral density, Effect of transfer function on power spectral density, Convolution, Power & energy transfer through a network, Correlation between waveforms, Power & cross correlation, Autocorrelation, Autocorrelation of a periodic waveform, Autocorrelation of non-periodic waveform of finite energy.

Unit- 2

Frequency Translation

A method of frequency translation, Recovery of the base-band signal, Amplitude modulation Double sideband suppressed carrier AM, Generation of DSB-SC signals, Demodulation of DSB-SC Signals. Conventional amplitude modulation, Sideband & carrier power, Generation & demodulation of AM signals single sideband AM, Generation & demodulation of SSB Signals, Vestigial side band modulation, Comparison of various amplitude modulation systems, Frequency division multiplexing.

Unit-3

Frequency modulation

Mathematical representation of an FM signal, Spectrum of an FM signal, Phase modulation, Stereophonic FM broadcasting, Comparisons: Frequency & phase modulation, Frequency & Amplitude modulation, Generation of FM waves: Indirect method of Armstrong & Direct generation, Demodulation of FM signals, Phase locked loop, Analysis of phase locked loop, Second order phase locked loop.

Unit-4

Noise

External & internal noise, Noise calculations, Noise figure, Noise temperature, Noise in Amplitude modulation system, Advantage of super-heterodyne principle : Single channel, SSB-SC, DSB-SC, Square law & Envelope demodulator.

Unit-5

Noise in FM systems :

Calculation of output signal & noise powers, Pre-emphasis & de-emphasis: Single Channel, Pre-emphasis & de-emphasis in commercial FM broadcasting.Sampling theorem: low pass signals, Pulse amplitude modulation, Other forms of pulse modulation, Time division multiplexing, Bandwidth required for transmission of PAM signals, Comparison of FDM & TDM systems.

Unit-6

Quantization of signals :

Quantization error, Pulse code modulation, PCM system, Companding & Differential PCM Delta modulation & Adaptive Delta modulation. Digital carrier schemes : FSK, PSK & DPSK, Compatible color Television (CCTV) Multiplexing & De-multiplexing of Luminance & Chrominance signals.

Recommended Books:

1. H.Taub & D.L.Schilling Principles of communication systems, McGraw-Hill.
2. G.K.Mithal, Radio Engineering : Applied Electronics Vol.II
3. B.P.Lathi, Modern Digital & Analog communication systems, Prism Books Pvt.Ltd.
4. G. Kennedy, Electronic communication systems, McGraw-Hill
5. J.G.Proakis & M. Salehi,,Fundamentals of communication systems: Pearson Education.
6. D. Roddy & J. Coolem, Electronic communications, PHI.
7. K. Samshanmugum, Digital & Analog communication systems, Johan Wiley & Sons.

Theory Tutorial (EL-424)

1 Review of Fourier series and Fourier transform
2 Parseval's theorem
3 Introduction to modulation & demodulation
4 Normalized power
5 Comparison of FDM & TDM
6 Phase locked loop application
7 Natural & Flat-top sampling
8 Elements of a digital communication system source encoder / decoder, channel, modulator - demodulator & other functional blocks
9 Comparison of Analog & digital communication systems.

M.Sc. (Electronics) : Semester –II

EL- 425 :Practicals

1. To design, build & test Mono-stable Multivibrator.
2. To design, build & test Wein-bridge Oscillator using IC-741.
3. To design, build & test Band Pass Filter.
4. To design, build & test Analog to Digital Converter.
5. To design, build & test a ROM using diode matrix for BCD to seven segment Code conversion for 7-segment LED display.
6. To design, build & test Full Adder & Subtractor using basic & EX-OR Gates.
7. To design, build & test 4-bit Binary down counter.
8. To design, build & test Gray to Binary code converter.
9. Study of Characteristics of Thermistor, Varactor Diode.
10. Study of Characteristics of Photodiode.
11. Study of Instrumentation Amplifier.
12. To design, build & test a 4-bit Serial input parallel output right Shift resistor using J-K flip-flops & its modification using D-flip flops.
13. Study of the Tri-state PIPO resistors using D-flip flops.
14. Study of PCM Encoder & Decoder.

Recommended Books

1. Ramakant A. Gayakwad, OP-AMPS & Linear Integrated Circuits : PHI.
2. David A. Bell, Solid State Pulse Circuit : Reston Publishing Comp., Inc. Reston, Virginia.
3. Albert P. Malvino & Donald P.Leach, Digital Principles & Application : McGraw-Hill, International Editions.

Laboratory Tutorials

1. Study of PAM, PWM, & PPM Modulation & De-modulation.
2. Study of FSK & PSK.
3. Study of Thermocouple.
4. Study of Piezo-electric Transducer & LDR.
5. Study of displacement measurement using Inductive Pick up.

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Revised Syllabus (Effective from June-2011)

M.Sc. (ELECTRONICS)
Structure for Semester III

THIRD SEMESTER:

Course No.	Title	Theory / Lab. Hours per week			External Exam. Marks	Internal Marks	Total Marks
		Theory	Tutorial	Total Hours			
EL-531	Microwave	04	01	05	70	30	100
EL-532	Lasers & Its applications	04	01	05	70	30	100
EL-533	Solid State Devices	04	01	05	70	30	100
EL-534	Instrumentation	04	01	05	70	30	100
EL-535	Practicals	09	01	10	140	60	200

Practicals : 14 to 16 Practicals in each semester will be given in the Laboratory Work.

DISTRIBUTION OF INTERNAL MARKS:

For each Theory Papers :	Weightage age of Marks
1. One Unit Test per Semester	20
2. One Tutorial Test per Paper Per Semester	05
3. One Assignment per Paper Per Semester	05
Total	30

For each Practical Course :	Weightage age of Marks
1. One Practical Test per Semester	40
2. Assessment of Journal Per Semester	20
Total	60

M.Sc.- (Electronics): Semester - III

EL-531: Microwave

Unit- 1

Microwave frequencies, Tunnel diode, Backward diode, MIS tunnel diode, Avalanche Transit Time Devices: IMPATT diode, TRAPATT diode, BARITT diode

Unit- 2

Transferred Electron Devices: Gunn- effect diode-GaAs diode, Ridley – Watkins – Hilsum(RWH) Theory, Modes of operation, Limited Space-charge Accumulation Diodes.

Unit -3

Microwave Transmission Lines: Transmission line equations and Solutions, Reflection and Transmission coefficient, Standing wave and Standing wave ratio, Line Impedance and Admittance, Smith chart, Impedance matching.

Unit -4

Circular waveguides, Microwave cavities, Microwave hybrid Circuits, Directional Couplers, Circulators & Isolators.

Unit- 5

Klystrons: Reentrant cavities, Velocity-modulation process, Bunching process, Output power & beam loading, Reflex klystrons: Velocity modulation, Power output & efficiency, Electronic admittance, Strip lines: Micro strip lines, Parallel strip lines.

Unit- 6

Helix Traveling wave tubes: Slow-Wave structures, Amplification process, Convection current, Axial electric field, Wave modes, Gain consideration, Magnetron oscillators: Cylindrical, Linear, Coaxial, Voltage- Tunable, Inverted coaxial & Frequency, Agile coaxial magnetrons.

Recommended Books:

1. Samuel Y. Liao, Microwave Devices & circuits: Prentice Hall of India Private Limited.
2. M.L. Sisodia & Vijay Laxmi Gupta, Microwaves: Introduction to Circuits, Devices and Antennas : New Age International (P) Limited.
3. S.M.Sze, Physics of semiconductor Devices: John Wiley & Sons, New York.

Theory Tutorial (EI-531)

1. Microwave measurements.
2. Frequency measurements.
3. Slotted line techniques for VSWR measurement.
4. Attenuation measurements.
5. Power measurements.
6. Reflecto-meter techniques.
7. Measurement of Cavity Q.

M.Sc. (Electronics): Semester-III

EL- 532: Laser and its Applications

Unit -1

Laser : Introduction, Einstein coefficients, Population inversion, Methods of population inversion, Threshold conditions, Laser rate equations: Two, three & four level systems, Variation of Laser power around threshold, Optimum output coupling.

Unit -2

Optical Resonators: Modes of a rectangular cavity & open planar resonator, Quality factor, Ultimate line-width of the laser, Transverse & longitudinal mode selection, Q- switching, Techniques & for Q- switching, Mode locking in lasers, Techniques for mode locking, Modes of confocal resonator system, General spherical resonator, Higher order modes.

Unit -3

Properties of laser beams & types of lasers: Coherence properties of laser light, Temporal Coherence, Spatial Coherence, Directionality, Ruby laser, Neodymium lasers (Nd: YAG & Nd: Glass) He- Ne laser, CO_2 laser, Argon ion laser, Dye laser, Semiconductor lasers.

Unit -4

Applications of lasers: Holography, Laser induced fusion: Introduction, Fusion Process, Laser energy requirements, Laser induced fusion reactor, Light wave communications : Light information carrying capacity of light waves, Optical fiber amplifier, Amplifier modeling.

Unit-5

Non-linear optics: Introduction, Second harmonic generation, Phase matching, Third harmonic generation, Optical mixing, Parametric generation light, Self-focusing of light, Multiphoton process: Multiquantum Photoelectric effect, Two photon processes, Theory of two photon processes, Experiments in two photon processes, Three photon processes, SHG & parametric generation of light in three photon process, Parametric light oscillator, Frequency up conversion, Phase conjugate optics.

Unit- 6

Laser Spectroscopy: Rayleigh & Raman scattering, Stimulated Raman effect, Hyper- Raman effect: Classical & Quantum mechanical treatment, Coherent anti stokes Raman Scattering, Spin Flip Raman laser, Free- electron laser, photo-acoustic Raman spectroscopy, Brillouin Scattering, Saturation Absorption spectroscopy, Doppler free two photon spectroscopy.

Optical Solitons: Introduction, Self phase modulation, Spectra of self-phase modulated pulses, Derivation of soliton power, compression of a chirped pulses.

Recommended Books:

1. B.B.Laud, Lasers & Non – linear optics: Wiley Eastern Limited.
2. Ajay Ghatak & K. Thyagarajan, Introduction to Fiber Optics: Cambridge University press.
3. Orazio svelto & David C. Hanna, Principles of Lasers: Plenum Press New York and London.
4. J. H. Franz & V. K. Jain, Optical Communications Components & Systems: Narosa Publishing House.
5. Eugene Hecht, Optics: Pearson Education; Inc.
6. K. Ghatak & K. Thyagarajan, Optical Electronics, Cambridge University press.

Theory Tutorial (EL-532)

1. Applications of laser in pure & applied sciences.
2. Chemical lasers.
3. Non- liners effects in Fibers.
4. Kerr effect.
5. Fourier transforms & Optical application.
6. Coherence & stellar interferometry.
7. Components of a lightwave communication system: Optical fiber.
8. Modulators & Detectors of a lightwave communication system.

M.Sc. (Electronics): Semester - III

EL-533: Solid State Devices

Unit-I

Introduction

Carrier transport phenomena, Phonon spectra, optical thermal and high field properties of semiconductor, basic equation for semiconductor device operation.

Unit-2

p-n Junction Diode

Depletion region and depletion capacitance, current-voltage characteristics, junction breakdown.

Unit-3

Bipolar transistor

Junction transistors, microwave transistors, power transistors, switching transistor.

Unit-4

Thyristor

Basic characteristic, Shockley diode and three terminal Thyristor, uni-junction transistor and trigger Thyristor.

Unit-5

Optical Devices

Optical absorption, solar cell, photo-detectors, photoluminescence and electroluminescence, light emitting diode, laser diode.

Unit-6

Semiconductor Power Devices

Power bipolar transistor, power MOSFETs, heat sinks and junction temperature, power thyristor, diac and triac, IGBT, SIT, HEMT.

Recommended Books:

1. D.A. Neamen, Semiconductor Physics and devices, Tata McGraw-Hill Publishing Company Limited. .
2. S.M. Sze, Physics, of semiconductor devices, Wiley-Interscience, 1981.
3. B.G. Streetman, Solid State Electronic Devices, Prentice-Hall of India Private Limited 3rd Ed.1994.
4. R.M. Warner and B.Z. Grang, Transistors, John Wiley, 1983.

Theory Tutorials (EL-533)

1. Importance and Effects of carrier transportation in semiconductors.
2. Study of the decay of photo-excited carriers in semiconductors using Maxwell Equations.
3. Applications of diode.
4. Transient behavior of the Diode.
5. Applications of switching transistor.
6. Comparison between microwave transistor and switching transistors.
7. Applications of Shockley diode.
8. Applications of Thyristor for low and medium power control.
9. Circuit design for photo detection techniques.
10. Applications of solar cell and its limitations.
11. Applications of laser diode.
12. Circuit design for power control using power devices.

M.Sc. (Electronics): Semester -III

EL -534: Instrumentation

Unit -1

Introduction

Functional elements of an instrument, Input - Output configuration of measuring instruments & instrument Systems, Methods of correction for interfacing & modifying inputs.

Unit -2

Filtering & Signal analysis

Passive & active filters, Types of filters, Frequency transformation, Realization of practical filters, Signal analyzers, Frequency analysis, methods of analysis, Application of Signal analysis.

Unit -3

Optical Instruments:

Spectroscopic Instrumentation, Visible & infrared Spectroscopy, Spectrometer design, Refraction & diffraction, Lenses & refractive optics, Dispersive elements, Spectrophotometers: Single beam null-type spectrophotometers, Double-beam ratio-recording Spectrophotometers, Atomic absorption spectrophotometers, Atomic absorption Instrumentation.

Unit -4

Electrodes, Sensors & Transducers:

Sensor error source Tactics & signal processing for improved sensing, Electrodes for biophysical sensing, Medical surface electrodes, Micro electrodes, Temperature transducers. Electro-Cardiographs: ECG Waveform, Other ECG signals, ECG Preamplifier, ECG Machine, ECG Machine Maintenance.

Unit -5

Medical Laboratory Instrumentation:

Overview of Clinical instrumentation, Colorimeter, Flame Photometer, Spectro-photometer, Blood Cell Counters, pH / Blood Gas analyzers, Chromatograph, Auto-analyzer, Basic Renal Physiology, Renal Failure, Peritoneal Dialysis, Hemo-dialysis machine, High-flux & High efficiency dialysis, Electrical safety precautions, Faults, Troubleshooting & maintenance.

Unit -6

Advance Biomedical and Environment Instrumentation

Instrumentation for measuring anatomical & Physiological parameters of the brain, cerebral angiography, Cranial X-rays, Brain Scans, Electroencephalography, EEG electrodes & the 10-20 System, EEG diagnostic uses & sleep patterns, EEG system, Preamplifiers & EEG system specifications. Environmental pollution monitoring instruments, Air pollution monitoring instruments, Carbon monoxide, Sulpher dioxide, Nitrogen Oxides, Hydrocarbons, Ozone, Automated wet-chemical air analysis, Water pollution monitoring instruments.

Recommended Books:

1. B.E. Jones, Instrumentation measurement & feedback: TMH.
2. E.O. Doebelin, Measurement Systems, Applications and Design: McGraw-Hill.
3. A.K.Sawhney, A course in mechanical measurements & Instrumentation: Dhanpat Rai & sons.
4. C.S.Rangan, G.R.Sharma, V.S.V.Mani, Instrumentation, Devices & Systems: TMH.
5. J.J.Carr & J.M.Brown, Introduction to Biomedical Equipment Technology: Pearson Education, Inc.
6. R.S.Khandpur, Handbook of Analytical Instruments: TMH.
7. A.James, Diefenderfer, Principles of Electronic Instrumentation: W.B.Saunders.
8. M.Sayer & A. Mansingh, Measurement, Instrumentation & Experiment design in Physics & Engineering: PHI.

Theory Tutorials (EL- 534)

1. Review of Autocorrelation & Crass correlation functions.
2. Lock-in-Amplifier operation & related Problems.
3. Review of Laplace Transform.
4. Design of various types of filters.
5. Grating Spectrometer, Absorption Spectrometer & Double beam absorption Spectrometer.
6. ECG Faults & Troubleshooting.
7. Blood (Purpose & Components).
8. Blood tests (Cells & Chemistry).
9. EEG System artifacts, faults, troubleshooting & maintenance.

M.Sc. (Electronics): Semester – III

EL -535: Practicals

1. To design, build and test (i) BCD to Excess-3 code converter (ii) Excess-3 to BCD cod converter.
2. To design, build and test digital comparator.
3. To design build and test parity generator.
4. To design build and test irregular counter using J-K flip flop.
5. Application of an analog comparator as,
   (i) Window detector.
   (ii) TTL interface.
   (iii) Heat detector.
6. To design, build and test analog multiplexer and de-multiplexer.
7. To design, build and test using IC 555 (i) Square wave generator and (ii) Duty cycle generator.
8. Programming exercise in Assembly & C language for Microcontrollers.
9. Study of Delta Modulator and Adaptive Delta Modulator.
10. Study of PCM Modulation and De Modulation.
11. Microwave Experiments.
12. Laser Experiments.
13. Experiments of fiber optics.
14. Study of LVDT and Strain gauge.
15. Study of Capacitive transducer and Thermistor.

Recommended Books:

1. A.P.Malvino, D.P.Leach, Digital principal and applications, Tata McGraw-Hill Company Ltd.
2. R.A. Gaikwad, Op. Amps and linear Integrated circuits PHI.
3. S. G. Kochar, Programming in C, CBS Publication,
4. H. Taub & D .L. Schilling, Principle of Communication System, McGraw Hill International Edition.

Practical Tutorials (EL - 535):

1. Study of tools for fiber optics.
2. Study of CAD software (PCB Designing Software)
3. Designing of power supplies.
4. Study of frequency shift keying.
5. Study of phase-locked loops.
6. Study of optical communication system.
7. Study of time division multiplexing.

VEER NARMAD SOUTH GUJARAT UNIVERSITY,
DEPARTMENT OF PHYSICS
SURAT- 395 007 (GUJARAT)
Revised Syllabus (Effective from June-2011)

M.Sc. (ELECTRONICS)
Structure for Semester IV

FOURTH SEMESTER:

Course No.	Title	Theory / Lab. Hours per week			External Exam. Marks	Internal Marks	Total Marks
		Theory	Tutorial	Total Hours			
EL-541	Optoelectronics	04	01	05	70	30	100
EL-542	Integrated Circuit Technology	04	01	05	70	30	100
EL-543	Analog and Digital circuit	04	01	05	70	30	100
EL-544	Electronic Communication-II	04	01	05	70	30	100
EL-545	Practicals	09	01	10	140	60	200

Practicals : Project in IVth semester will be given in the Laboratory Work.

DISTRIBUTION OF INTERNAL MARKS:

For each Theory Papers :	Weightage age of Marks
1. One Unit Test per Semester	20
2. One Tutorial Test per Paper Per Semester	05
3. One Assignment per Paper Per Semester	05
Total	30

For each Practical Course :	Weightage age of Marks
1. One Practical Test per Semester	40
2. Assessment of Journal Per Semester	20
Total	60

M.Sc. (Electronics) Semester – IV

EL-541: Opto Electronics

Unit-1

Introduction to fiber propagation using a ray model, Introduction, Step index fiber: numerical aperture & multipath dispersion, Propagation & multipath dispersion in graded index fiber, Material dispersion, Refractive index of the bulk media: theory & experimental values, The combined effect of Material dispersion and Multipath dispersion, Root- mean- square Pulse widths and Frequency response: RMS pulse widths, Frequency response, Total RMS pulse width.

Unit-2

Electromagnetic wave propagation in step index fibers, Modes and Rays, Wave propagation modes in an ideal step index fiber, Weakly guiding solutions, Time dispersion in step index fibers, Single mode fibers.

Unit-3

Electromagnetic wave propagation in graded index fibers, Modes in graded index fibers: introduction, Approximate solution, Number of propagating modes, Variation of the propagation constant, The equivalence of the WKB approximation and the ray model, Intermode dispersion in graded index fiber: Neglecting & including material dispersion, Intramode dispersion in graded index fibers, Total dispersion in graded index fibers, Mode coupling.

Unit-4

Measurements,Attenuation measurements: Cutback attenuation measurement method & OTDR, Fibers fault location, Dispersion measurements: Time & Frequency domain dispersion measurements, Refractive index profile measurements: End reflection technique, Transmitted & reflected near field techniques, Interferometric methods, Focusing method, Measurement of optical source characteristics: LED response time, Harmonic distortion, Intermodulation distortion, Eye Pattern.

Unit-5

Optical fiber fabrication and cabling: Fiber materials, Fiber fabrication, Mechanical properties of fibers, Fiber optic cables, Fiber – to – fiber joints, Splicing techniques, Optical fiber connectors.

Unit-6

Optical fiber sensors: Temperature sensors, Pressure sensors, Liquid level sensors, Flow sensors, Magnetic sensors, Displacement sensors, Pollution sensors, Medical applications, Fiber optic Gyroscope.

Recommended Books:

1. G. keiser, Optical Fiber Communications: McGraw- Hill.
2. C.K.Kao , Optical Fiber systems Technology, Design & Applications: McGraw-Hill.
3. Chai Yeh, Handbook of Fiber Optics: Theory & Applications: Academic Press, Inc.
4. J. Gowar, Optical Communication Systems: PHI.

Theory Tutorial (EI-541)

1. The electromagnetic wave equation in an Isotropic medium Subject to cylindrical boundary conditions.
2. Electromagnetic waves in graded index fiber: The WKB Approximation.
3. Ray trajectories in graded index fiber.
4. Source- fiber coupling.
5. Fiber couplers.
6. Fiber connection loss: Extrinsic &Intrinsic.
7. Decibel, Neper definitions & related examples.

M.Sc. (Electronics): Semester – IV

EL- 542: Integrated Circuits Technology

Unit-1

Refining and Growth of Silicon system

Classification of ICs, Production of Electronics grade silicon, Czochralski and Flot Zone Crystal Growing Methods, Oxygen and Carbon in silicon, Segregation coefficients, Silicon shaping and wafer preparation, Vapor Phase Epitaxy, Molecular Beam Epitaxy.

Unit-2

Oxidation

Utility of Thermal Oxidation , Dry & Wet, High Pressure and Plasma Oxidation, Growth and properties of oxide layer on silicon, Oxide Charges, Effect of impurities on the oxidation rate, Growth and Properties of Thin Oxides, Oxide masking and Oxide Passivation.

Unit-3

Photo Lithography

Photo Lithography, Optical Lithography, Photo-mask, Photoresist and Process, Electron Lithography, X-ray Lithography, Ion Beam Lithography

Unit-4

Reactive Plasma Etching and Metallization

Etching – Wet Chemical Etching, Reactive Plasma etching, Impurity Doping-Diffusion, Ion Implantation, Metallization-Desired Properties, Applications, Ohmic- contacts, Choices and Problems.

Unit-5

VLSI Process Integration

Integrated Elements: Isolation of Circuit elements, Bipolar Technology: NPN Transistors, PNP Transistors, Integrated Diodes; Semiconductor Resistors, Capacitors and Inductors, MOS Technology: NMOS and CMOS IC Technology.

Unit-6

Assembly Techniques

Design of typical ICs, Back side of preparation, Wafer sort, Device Separation, Die Bonding, Wire Bonding, Package Types and Considerations, Testing of ICs.

Recommended Books:

1. S.M. Sze, VLSI Technology, McGraw Hill International Edition.
2. Integrated Electronics by K. R. Botkar.
3. Electronic Devices & Components by J. Seymour
4. W.R. Wesiey & K.E. Bean, Semiconductor Integrated Circuit Processing Technology, Addison Wesley Publishing Co.
5. Petter Gise & Rechard Blanchard, Modern Semiconductor Fabrication Technology, Reston Book – Prentice Hall.
6. James W. Mayer and S.S. Lav, Electronic Materials Science: For Integrated Circuit in Si and GaAs, MacMillan Publishing Co. New Delhi.
7. David J. Elliott, Microlithography: Process Technology for IC Fabrication Mc Graw Hill Book Co.
8. R.L. Geiger, P.E. Allen and N.R. Stradev. VLSI Design Techniques for Analog and Digital circuits.

Theory Tutorials (EL- 542)

1. Features of Hybrid IC Technology.
2. Thick Film Technology.
3. Thick Film Design Guidelines.
4. Advantages and Application of Thick Film Hybrids.
5. Thin Film Technology.
6. Thin Film processing.
7. Thin Film Design Guidelines.
8. Advantages and Application of Thin Film Hybrids.
9. Elements of Crystallography.
   (i) Periodic structure of crystal.
   (ii) Miller indices.

M.Sc. (Electronics): Semester -IV

EL- 543: Analog & Digital Electronics

Unit-1

Enhancement MOSFET, Enhancement MOSFET Volt-ampere characteristics, MOSFET, Circuit symbols, MOSFET as a Resistance, biasing the enhancement MOSFET, Small Signal Operation of the enhancement MOSFET amplifier, MOS amplifier with enhancement MOS, Load MOS analog switches, CMOS devices, BIFET-BIMOS Circuits.

Unit- 2

Monolithic Integrated Circuit Technology, Planer process, bipolar transistor fabrication, Fabrication of FETs, CMS Technology, Monolithic Diodes, Metal semiconductor contact, Integrated circuit resistors, Capacitors, Integrated circuit Packaging, Characteristics of integrated circuit components, Microelectronics circuit lay out.

Unit -3

BJT biasing for integrated circuits, Wilder current sources three transistor current sources, discrete component biasing and design, common-emitter amplifier with an emitter resistance high frequency response of a common-emitter stage, common-source stage at high frequency, emitter and source followers at high frequencies, time constant method of obtaining the response.

Unit -4

General Analysis of multistage feedback amplifiers, multi-loop feedback amplifiers, stability, test for stability compensations, frequency response of feedback amplifier the double pole transfer functions. Phase margin of the two-pole feedback amplifier, three pole feedback amplifier response, approximate analysis of a multi-pole feedback amplifier, approximate determination of the open-loop poles, compensation revisited.

Unit -5

NMOS, Inverter, Propagation delay of an NMOS inverter, NMOS logic gates, CMOS inverter, CMOS logic gates emitter-coupled logic circuits, Programmable RMOS, erasable ROMs, Programmable array logic, programmable logic arrays.

Unit -6

Dynamic MOS shift register, ratio-less shift register stages, CMOS domino logic RAM, Read-write memory cells, tri-polar RAM cells, charge-coupled devices, CCD structures, integrated injection logic.

Recommended Books:

1. J.Millman and A.Grable, Microelectronics: McGraw Hill.
2. A.S.Sedra & K.C.Smith, Microelectronics Circuits: Holt-Saunders, Japan.
3. D.E.Hodges & H.G.Jackson, Analysis and Design of Digital integrated circuits: McGraw Hill.
4. P.R.Gray & R.G. Meyor, Analysis and design of Analog integrated circuits: John Wiley.

Theory Tutorial (EL- 543)

1. BJT's and FET's.
2. VLSI Circuits design concepts.
3. Low Frequency & High Frequency response Models.
4. Bode Diagrams.
5. Operational Transfer Functions & Frequency Transfer Functions.
6. IC based Electronics Instruments.

M.Sc. (Electronics): Semester -IV

EL- 544: Electronic Communication – II

Unit-1

Digital Transmission : Advantages & disadvantages of digital transmission, Pulse code modulation, PCM sampling, Dynamic range, Coding efficiency, Signal – to – quantization noise ratio, Analog & Digital companding, Delta modulation PCM, Adaptive delta modulation PCM, Differential PCM, Pulse transmission, Intersymbol interference.

Unit-2

Digital communications: Digital radio, Frequency shift keying, Phase shift keying, Quadrature amplitude modulation, Bandwidth efficiency, Probability of error and Bit error rate.

Unit-3

Satellite communications: Geostationary satellites, Antenna look angles, Satellite antenna radiation patterns: Footprints, Satellite system Parameters, Satellite System link equations, Link equations & Link budget.

Unit-4

Microwave radio communications & system gain: Advantages of Microwave radio communications, Frequency modulated microwave radio system, FM Microwave radio repeaters, Diversity, Protection switching arrangements, FM microwave radio stations, Path characteristics, System gain.

Unit-5

Telephone Switching: Elemental phone system, central switching, A simple exchange, Strowger automatic dialing system, Traffic load and service grade, Hierarchy of switching offices, Crossbar switch, Common control, Switching matrices, Multiple stage switching, Two & Four wire connections, Time slot interchanging, Space array for digital signals, Combined space & time switching.

Unit-6

Spread spectrum modulation: Direct sequence spread spectrum, Use of spread spectrum with CDMA, Ranging using DS spread spectrum, Frequency Hopping spread spectrum, Generation & Characteristics, of PN sequences, Acquisition & tracking of an FH signal, Acquisition & tracking of a DS signal.

Recommended Books:

1. Wayne Tomasi, Advanced Electronic Communications systems : PHI.
2. H. Taub & D. L. Schilling, Principles of communication systems: McGraw-Hill.
3. B.P.Lathi, Modern Digital and Analog communication systems: Holt, Rinehart & Winston, Inc.

Theory Tutorial (EL-544)

1. Sampling rate.
2. Digital Amplitude modulation.
3. Kepler's laws.
4. Satellite orbits.
5. Time division multiplexing.
6. Analog time division switching.
7. Comparison of TSI with space switching.
8. Satellite multiple accessing: FDMA, TDMA, CDMA.

M.Sc. (Electronics): Semester -IV

EL- 545: Practicals

Project Work of Relevant Subject…..