Detailed Syllabus

Of

B. Tech. Programme

In

Electronics & Communication Engineering

P. G. Department of Electronics & Instrumentation Technology
University of Kashmir
Hazratbal, Srinagar-6, J & K
# Course Layout

## First Year: 1\textsuperscript{ST} SEMESTER

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Detailed Syllabus of B. Tech. (ECE), P. G. Department of Electronics & IT, University of Kashmir
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# Course Layout (B.Tech. ECE) DOEIT, KU

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Course No: ECE 101

MATHEMATICS – I

Unit I
**Calculus:** Differential calculus of functions of several variables, Partial differentiation, homogeneous functions and Euler’s theorem, Taylor’s and Maclaurin’s series, Taylor’s theorem and mean value theorem for functions of two variables, Errors and approximations.

Unit II
**Applications of Differential Calculus:** Maxima and minima of several variables, Lagrange’s method of multipliers for maxima and minima, Curvature of cartesian curves, Curvature of parametric & polar curves, Curve tracing.

Unit III
**Applications of Definite Integrals:** Application of definite integrals to area, arc length, surface area and volume, double integrals, Triple integrals, Change of order of integration, Applications.

Unit IV
**Vector Calculus:** Scalar and vector fields, differentiation of vectors, Velocity and acceleration, Vector differential operator, Del, Gradient and Divergence, Physical interpretation of the above operators, Formulae involving Del applied to product of point function, Line, surface and volume integrals.

Unit V
**Application of Vector Calculus:** Flux, solenoidal and irrotational vectors, Gauss divergence theorem, Green’s theorem in plane, Stoke’s theorem, Applications to electromagnetics and fluid mechanics.

Books Recommended

Course No: ECE 102

PHYSICS

Unit I
**Electrostatics:** Gradient of a scalar, Divergence and curl of a vector, Gauss’s law and its applications, Electric potential and electric field (in vector form), Potential due to a monopole, Dipole and multipoles (multipole expansion), Work and energy in electrostatics; dielectrics, Polarization, electric displacement, Susceptibility & permittivity, Clausius Mossotti equation.
Unit II

**Magneto-statics and Electrodynamics:** Lorentz Force Law; magnetic field of a steady current (Biot–Savart law), Ampere’s law and its applications, Aampere’s law in magnetized materials, electromotive force, Faraday’s law, Maxwell’s Equations, Wave Equation.

Unit III

**Lasers:** Spontaneous and stimulated emission, Einstein’s coefficients, population inversion and optical pumping; Three and four-level lasers, Ruby, He-Ne, Nd:YAG, CO₂, Semiconductor lasers, Industrial and medical applications of lasers.

Unit IV

**Theory of Relativity:** Invariance of an equation and concept of ether, Michelson Morley experiment, Einstein’s postulates and Lorentz transformation equations, length, time and simultaneity in relativity, addition of velocity, variation of mass with velocity, mass-energy relation, energy-momentum relation.

Unit V

**Quantum Theory:** The Compton effect, matter waves; group and phase velocities, Uncertainty principle and its application; time independent and time dependent, Schrodinger wave equation, Eigen values and Eigen functions, Born’s interpretation and normalization of wave function, orthogonal wave functions, applications of Schrodinger wave equation (particle in a box and harmonic oscillator).

**Books Recommended**

4. Arya A P “Elementary Modern Physics” Addison-Wesley, Singapore

**Course No: ECE 103**

**ELECTRICAL SCIENCE**

Unit I

**Network Laws and Theorems:** Network Laws for d.c. networks, Node voltage & Mesh Current methods, Delta – star and star – delta conversion, Classification of network elements, Principle of superposition and Thevenin’s & Norton’s Theorems.

Unit II

**Single Phase A.C. Circuits:** 1-phase EMF generation, Effective and Average values of sinusoids and determination of form factor, Analysis of simple RLC-series circuits, Solution of parallel circuits and Resonance.

**Three Phase A.C. Circuits** 3-phase EMF generation, Delta and star connection, Line & phase quantities and relations, Solution of 3-phase circuits – balanced voltage & balanced load, Phasor diagrams, Measurement of power in three-phase circuits and Three-phase, 4-wire circuits.
Unit III

**Magnetic Circuits**: Analogy between electric & magnetic circuits, Ampere’s circuital law, Solutions of Magnetic circuits, Hysteresis and Eddy current losses.

**Transformers**: Constructional details, EMF equation, rating and phasor diagrams on no load & full load, Equivalent circuits, Regulation and efficiency, Open circuit & short circuit tests, Auto transformers.

**Induction Motors**: Production of revolving magnetic field, Principle of operation, Equivalent circuit, Torque-speed characteristics, Starter for squirrel cage & wound rotor induction motors, Single-phase induction motors – applications.

Unit IV


Unit V

**Electrical Measuring Instruments**: Operation of an instrument, PMMC instruments, Shunts & Multipliers, Multi-meters and uses, moving iron ammeters & voltmeters, Dynamometer wattmeters, A.C. watt-hour meters.

**Books Recommended**


Course No: ECE 104

**COMPUTER FUNDAMENTALS**

Unit I


Unit II

**Introduction to Programming and Problem Solving** - The Basic Model of Computation, Algorithms, Flow-charts, Programming Languages, Compilation, Linking and Loading, Testing and Debugging, Documentation, **Algorithms for Problem Solving** - Exchanging values of two variables, summation of a set of numbers, Decimal Base to Binary Base conversion, Reversing digits of an integer, GCD (Greatest Common Division) of two numbers, Test whether a number is prime, Organize numbers in ascending order, Find square root of a number, factorial computation, Fibonacci sequence, Evaluate ‘sin x’ as sum of a series, Reverse order of elements of an array, Find largest number in an array, Print elements of upper triangular matrix, multiplication of two matrices, Evaluate a Polynomial.
Unit III  
**Introduction to ‘C’ Language** - Character set, Variables and Identifiers, Built-in Data Types, Variable Definition, Arithmetic operators and Expressions, Constants and Literals, Simple assignment statement, Basic input/output statement, Simple ‘C’ programs, **Conditional Statements and Loops** - Decision making within a program, Conditions, Relational Operators, Logical Connectives, *if* statement, *if-else* statement, Loops: *while* loop, do while, *for* loop, Nested loops, Infinite loops, *Switch* statement, structured Programming.

Unit IV  
**Arrays** - One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix; Null terminated strings as array of characters, Representation sparse matrices, **Functions** - Top-down approach of problem solving, Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, Passing arguments to a Function: call by reference, call by value, Recursive Functions, arrays as function arguments

Unit V  
**Structures and Unions** - Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions, **Pointers** - Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays. **File Processing** - Concept of Files, File opening in various modes and closing of a file, Reading from a file, writing onto a file.

**Books Recommended**
2. Turban, Mclear and Wetherbe, "Information Technology and Management"
3. Byron Gottfried "Programming with C"
4. R.G. Dromey, "How to solve it by Computer"
5. E. Balaguruswamy, "Programming with ANSI-C"
6. A. Kamthane, "Programming with ANSI & Turbo C"

**Course No: ECE 105**

**INTRODUCTION TO BIO-ENGINEERING**

Unit I  
**Classification of Microorganisms** - Classification, Identification and Nomenclature, 
**Morphological, Structure and Biochemical Characteristics of Prokaryotes and Eukaryotes** - Difference between Prokaryotes Cell and Eukaryotic Cell with Schematic representation, Major Characteristics of Microorganisms: Bacteria, Fungi (Mold and Yeast), Algae, Protozoa and Virus.

Unit II  
**Microbial Nutrients and Growth Media** - Bacteria, Fungi (Mold and Yeast), Algae, Protozoa and Virus, **Microbial Reproduction and Growth** - Bacteria, Fungi (Mold and Yeast), Algae, Protozoa and Virus

Unit III  
**Method in Microbiology** - Pure Culture Technique, Sterilization (Media and Air), Enrichment Culture, Techniques for isolation of Microorganisms, Microscopes including Staining, Techniques, Mutation.
Unit IV


Unit V

Bioprocess Engineering/Fermentation Technology – Basis of Bio-reactor design, Types of bio-reactors, efficient treatment, Elementary idea of canning and packing. Food preservation.

Books Recommended:

2. Biosciences on the Internet: A Student's Guide by Georges Dussart

Course No: ECE 106

**ENGLISH COMMUNICATION**

UNIT I

**Communication**: Meaning, its types, significance, process, Channels, barriers to communication, making communication effective, role in society. **Business Correspondence**: Elements of business writing, business letters, components and kinds, memorandum, reports writing, purchase order, quotation and tenders, job application letters, resume writing etc.

UNIT II

**Discussion Meeting and Telephonic Skills**: Group discussion, conducting a meeting, attending telephonic calls, oral presentation and role of audio visual aids. **Grammar**: Transformation of sentences, words used as different parts of speech one word substation, abbreviations, technical terms etc.

UNIT III

**Reading Skills**: Process of reading, reading purposes, models, strategies, methodologies, reading activities. **Writing Skills**: Elements of effective writing, writing style, scientific and technical writing.

UNIT IV

**Listening Skills**: The process of listening, the barrier to listening, the effective listening skills, feedback skills. **Speaking Skills**: Speech mechanism, organs of speech, production and classification of speech sound, phonetic transcription, the skills of effective speaking, the components of effective talk.

UNIT V


Books Recommended


Course No: ECE 107

LAB – I PHYSICS LAB

2. Measurement of e/m by Helical method.
4. Determination of Resistivity of a given wire.
5. Determination of Band Gap of a semiconductor.
7. To determine the refractive index of the prism material using spectrometer.
8. To verify the laws of vibrating strings by Melde’s experiments.
9. To determine the wavelength using Fransel’s biprism/diffraction grating.

Course No: ECE 108

LAB – II ELECTRICAL LAB (A)

1. To convert a galvanometer into ammeter.
2. To convert a galvanometer into voltmeter.
3. Verification of Ohm’s law.
4. Verification of KVL and KCL.
5. Verification of Thevenin’s and Norton’s theorem.
6. Verification of superposition theorem.
7. To plot the resonance curve for a series and parallel resonance.
8. To determine the armature and field resistance of a DC Machine.
9. To calibrate a test (moving iron) ammeter and a (dynamometer) wattmeter with respect to standard (DC PMMC) ammeter and voltmeters.
10. Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
11. Measurement of current, voltages and power in R-L-C series circuit excited by (single phase) AC supply.
12. To verify line and phase voltage.
14. Connection and starting of a three-phase induction motor using direct on line (DOL) or star-delta starter.
Course No: ECE 109

LAB – III COMPUTER LAB

1. Identification and functions of different internal and external components of computer system.
2. Experiments with MS Windows Operating system.
3. Familiarity with Linux Operating System.
4. Basic experiments in use of Networking for device and file shearing.
5. Experiments with WWW and Internet in uses of browsing, searching Digital Libraries, email and security.
6. Writing algorithms for stated problems.
7. Writing basic C programs.
8. Use of conditional statements and loops in programs.
9. Writing C programs using one and muti-dimentional arrays.
10. Writing programs using functions.
11. Use of pointers and structures in programs.
12. Creation, traversal and operations on Linked lists.
    Creation, reading, writing and operations on formatted and un-formatted files.
Course No: ECE 201

MATHEMATICS – II

Unit I

Ordinary Differential Equations: Formation of ordinary differential equations, solution of first order differential equations by separation of variables, Homogeneous equations, Exact differential equations, equations reducible to exact form by integrating factors, Equations of the first order and higher degree, Clairaut’s equations, Applications.

Unit II

Linear Differential Equations: Linear differential equations with constant coefficients, Cauchy’s homogeneous linear equations, Legendre’s linear equations, Simultaneous linear equations with constant coefficients, Applications.

Unit III

Partial Differential Equations: Formulation and classification of PDE’s, Solution of first order linear equations, Four standard forms of non-linear equations, Linear equations with constant coefficients, Applications, separation of variable method for solution of heat, wave and Laplace equation

Unit IV

Matrices: Linear dependence of matrices and rank of matrices, Linear transformations & inverse of matrices, Reduction to normal form, bilinear form and quadratic form, Consistency and solution of linear algebraic system of equations, Eigen values, Eigen vectors and their applications to system of ordinary differential equations, Cayley Hamilton theorem, Orthogonal, Unitary, Hermitian and similar matrices

Unit V

Probability and Statistics: Binomial law of probability - The binomial distribution, its mean and variance - poisson distribution as a limiting case of binomial distribution - its mean and variance - fitting of binomial & poisson distributions - normal distribution - properties of normal curve - standard normal curve - simple problems in binomial, poisson and normal distributions.

Books Recommended
Course No: ECE 202

CHEMISTRY

UNIT I


Chemical and Phase Equilibria: Phase diagram for single component system, Phase diagram for mixtures, Properties of non-electrolyte solutions, Kind of Electrodes, Concentration Cells, Corrosion of Metals in Acids, Corrosion by oxygen, Corrosion by Metal contact, The Lead storage cell and Fuel Cell.

UNIT II

Chemical Response to Photons: Laws of Photochemistry, Photo physical processes, Fluorescence and Phosphorescence, Flash proteolysis, Photochemical reactions: photolysis of HI, Photochemical reaction between H2 and Br2, Photosensitized reactions and Photocleavage of water.

UNIT III

Probes (Tools) for Structural Elucidation: Lambert Beer’s Law, Principles and applications of U.V.Visible, Molecular Absorption Spectroscopy; Chromophores, Effect of Conjugation on Chromophores, Absorption by aromatic systems, Rotational and Vibrational Spectroscopy–Principles and application to simple molecules, Magnetic Resonance Spectroscopy-Principles and Application to simple molecules and Introduction to Photoelectron Spectroscopy.

UNIT IV

Coordination Bond and its Implications: Bonding in tetrahedral and Octahedral Complexes, Applications in analytical chemistry, Biological system, Catalysis and Sandwich Compounds, Oxygen Storage and Transport.


UNIT V


Books Recommended

Course No: ECE 203

ELEMENTS OF MECHANICAL ENGINEERING

UNIT I

Introduction: System of forces, Coplanar concurrent force system, Composition and Resolution of forces, Equilibrium of rigid bodies, Free body diagram, Lami’s Theorem.

Analysis of Framed Structure: Reaction in beam with different end conditions, Determination of reactions in members of trusses: a) Analytical Methods b) Graphical Method

UNIT II

Centre of Gravity and Moment of Inertia: Concept of C.G. and centroid, Position of Centroid, Theorem of Parallel and Perpendicular Axes, Moment of inertia of simple geometrical figures.

Stress and Strain: Concept of Stress and Strain, Simple Stresses, Tensile, Compressive, Shear, Bending and Torsion, Stress-Strain Curves, Elongation of bars, Composite bars, Thermal Stresses, Elastic Constants, Mohr’s Circle

UNIT III

Physical Properties of fluids: System, Extensive and intensive properties: specific weight, mass density, specific gravity, viscosity, specific gravity, surface tension and capillarity, evaporability and vapour pressure, Newtonian and Non-Newtonian fluids

UNIT IV

Fluids Statics: Pressure, Hydrostatic law, Pascal’s law, Different types of manometer and other pressure measuring devices, Determination of metacentric height.

Fluid Kinematics and Dynamics: Classification of fluids, Streamline, Streakline and Pathlines, Flow rate and continuity equation, Bernoulli’s Theorem, Kinetic energy correction factor and momentum correction factor in Bernoulli’s equation.

UNIT V


Books Recommended

Course No: ECE 204

INDUSTRIAL MANAGEMENT AND ECONOMICS

UNIT I

UNIT II

UNIT III
Marketing Management: Pricing- Promotion- Channels of distribution- Market research-Advertising. Production Management: Batch and mass production- Inventory control- EOQ-Project planning by PERT/CPM- Construction of Network (Basic ideas only).

UNIT IV

UNIT V

Books Recommended
1. Industrial Management by O P Khanna, Dhanpat Rai Pub.
3. Marketing Management by Philip Kotler, PHI
4. Indian economy by A.N. Agarwal, Wishwa Prakashan

Course No: ECE 205

ENGINEERING GRAPHICS

Unit I

Unit II

**Projection of Points:** Projection in quadrants and octants, Projection of point on auxiliary planes.

**Projection of Lines:** Parallel to both H P and V P, Parallel to one and inclined to other, Contained in profile plane, Other typical cases: three view projection of straight lines, True length and angle orientations of straight line: rotation method and auxiliary plane method, Distance between two non-intersecting lines, Trace of lines.

**Projection of Planes:** Difference between plane and lamina, Projection of lamina, Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, Plane oblique to three reference planes, Application of auxiliary planes, Trace of planes.

Unit III

**Projection of Solids:** Definition of Solids, types of solids, and elements of solids, Projection of solids in first or third quadrant, Axis parallel to one and perpendicular to other, Axis parallel to one inclined to other, Axis inclined to both the principal plane, Axis perpendicular to profile plane and parallel to both H.P. and V.P., Visible and invisible details in the projection, Use of rotation and auxiliary plane method.

**Section of Solids:** Definition of Sectioning and its purpose, Procedure of Sectioning, Illustration through examples, Types of sectional planes-application to few typical examples.

Unit IV

**Intersection of Surfaces/Solids:** Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., Use of cutting plane and line method.

**Development of Surfaces:** Purpose of development, Parallel line, radial line and triangulation method, Development of prism, cylinder, cone and pyramid surfaces for both right angled and oblique solids, Development of surface.

Unit V

**Isometric Projection:** Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and drawing, Isometric projection of solids such as cube, prism, pyramid and cylinder, Discussion on insometric projection of simple machine parts.

**Orthographic Projection:** Review of principle of Orthographic Projection, Examples of simple machine parts, Drawing of Blocks and machine parts.

**Books Recommended**

Course No: ECE 206

LAB 1 – CHEMISTRY LAB

1. Determination of amount of sodium hydroxide and sodium carbonate in a mixture
2. Determination of total hardness of water by EDTA method.
3. Standardization of KMnO4 using sodium oxalate.
4. Determination of Ferrous iron in Mohr’s salt by potassium permanganate.
5. Determination of partition coefficients of iodine between benzene and water.
6. Determination of concentration of a coloured substance by spectrophotometer.
7. To study the adsorption of acetic acid on activated charcoal.
8. To verify Bear’s law for a coloured solution and to determine the concentration of a given unknown solution.
9. To draw the pH-titration curve of strong acid vs. strong base.
10. To determine concentration of a trace metals by atomic absorption spectrophotometer.
11. To draw the phase diagram of lead in binary system.

Course No: ECE 207

LAB II – MECHANICAL ENGINEERING LAB

1. Determination of Young’s modulus, tensile strength and percentage elongation for steel specimen on universal testing machine.
2. Plot stress-strain diagram and determine the yield point and percentage reduction in area for steel specimen.
3. Determination of deflection and verification of beam formula for a specimen in bending.
4. To determine the compressive strength for cast iron specimen on universal testing machine.
5. To perform the bending test on mild steel specimen.
6. To determine the shear strength using mild steel specimen on torsional testing machine.
7. To verify Bernoulli’s equation using hydraulic bench.
8. To find the coefficient of friction in pipes of different materials.
9. To find losses due to sudden expansion and sudden contraction in pipes.
10. To calculate Reynold’s number for laminar and turbulent flow.
11. To calculate metacentric height.

Course No: ECE 208

LAB III – ENGINEERING GRAPHICS LAB

1. Lettering-practice on graph paper and in sketchbook.
2. Dimensioning practice (take home assignment-study and draw sketches on sketchbook)
3. Drawing of plane scale and diagonal scale.
4. Geometrical constructions (Study and draw on sketch book).
5. Projection of points in quadrants and octants and on auxiliary planes. Simple and typical problems.
6. Projection of lines, simple and typical problems.
7. Projection planes-two view and three view problems. Solving the problems by rotation and auxiliary plane method simple and typical problems.
8. Projection of solids, projection of solids using rotation and auxiliary plane method. Special emphasis may be given on visible and indivisible details in projection of solids.
9. Sectioning of solids, determination of true section, simple and typical problems.
10. Intersection of surfaces/solids - simple and typical problems on intersection of solids, use of line and cutting plane method.
11. Development of surfaces - simple and typical problems related to prisms cylinders, cone, and pyramid (right angled and oblique solids).
12. Isometric projections, problems on isometric projection from orthographic projection of simple solids.

Note: The lab will be based on CAD software tools.

Course No: ECE 209

LAB IV – ELECTRICAL LAB (B)

1. Connection and measurement of power consumption of a fluorescent lamp.
2. Determination of open circuit characteristics (OCC) of a DC machine.
3. Starting and speed control of a DC shunt motor.
4. Connection and testing of a single-phase energy meter (unit power factor load only).
5. Two-wattmeter method of measuring power in three-phase circuit (resistive load only).
6. Measurement of thermo emf between different types of thermocouples as a function of temperature difference between the junction, measurement of an unknown temperature.
7. Design and use of potentiometer.
8. Study of LCR circuit with AC current.
11. To get familiar with the working knowledge of the following instruments:
   i. Cathode ray oscilloscope (CRO).
   ii. Multimeter (Analog and Digital).
   iii. Function Generator.
   iv. Power supply.
12. i. To measure phase difference between two waveforms using CRO.
    ii. To measure an unknown frequency from Lissajous figures using CRO.
Course No: ECE 301

ENGINEERING MATHEMATICS - I

Unit I
Fourier Series and Transforms: Fourier series of periodic functions, even and odd functions, Half range expansions and Fourier series of different wave forms, Complex form of Fourier series and practical harmonic analysis, Fourier integral theorem, Fourier sine, cosine integrals and transforms, Fourier transforms of derivatives of a function, Inverse Laplace transform by the method of residues, Application of transforms to boundary value problems.

Unit II
Laplace Transform: Laplace transform of various standard functions, properties of Laplace transforms and inverse Laplace transforms, Convolution theorem, Laplace transform of unit step functions, impulse functions and periodic functions, Application to solution of ordinary differential equations with constant coefficients and simultaneous differential equations.

Unit III
Complex Analysis: Limit and derivative of a complex function, Analytic functions and Cauchy Riemann equations, Line integral of elementary functions, Cauchy’s integral theorem, Cauchy’s integral formula and derivatives of analytic functions, Convergence of sequences, series and power series, Taylor and Laurent series, Zeros and singularities, residues and residue theorem, Evaluation of real improper integrals, Conformal mappings, linear fractional transformations and mappings by elementary functions

Unit IV

Unit V

Books Recommended
5. Advanced Engineering Mathematics: Michael D Greenberg- PHI.
Course No: ECE 302

SOLID STATE DEVICES

UNIT I

Energy bands and charge carriers in semiconductors: energy bands- metals- semiconductors and insulators- direct and indirect semiconductors- charge carriers in semiconductors: electrons and holes- intrinsic and extrinsic material- n-material and p-material- carrier concentration: fermi level- EHPs- temperature dependance- conductivity and mobility- drift and resistance- effect of temperature and doping on mobility, hall effect.

UNIT II

Diffusion of carriers- derivation of diffusion constant D-Einstein relation- continuity equation- p-n junctions: contact potential- equilibrium fermi levels- space charge at junctions- current components at a junction: majority and minority carrier currents- zener and avalanche breakdown- capacitance of p-n junctions.

UNIT III

p-n junction diodes: volt-ampere characteristics- switching time- rectifier action- Zener diodes: volt-ampere characteristics- Tunnel diodes: tunneling phenomena- volt-ampere characteristics- Varactor diodes- Photo diodes: detection principle- light emitting diodes.

UNIT IV

Bipolar junction transistors: npn and pnp transistor action- open circuited transistor- biasing in active region- majority and minority carrier distribution- terminal currents- amplification and switching- α and β gain factors- emitter efficiency γ- schottky transistors- photo transistors.

UNIT V

Field effect transistors: operation- pinch off and saturation- pinch off voltage- gate control- volt-ampere characteristics- MOSFETS: n MOS and p MOS: comparison- enhancement and depletion types- control of threshold voltage- MOS capacitance.

Books Recommended
1. Solid state electronic devices - Ben G Streetman- Pearson Education
2. Microelectronic Devices - Nagchaudhari, Pearson Education
6. Physics of semiconductor devices - Shur- PHI.
7. Theory of Semiconductor devices - Karl Hess- PHI.

Course No: ECE 303

BASIC INSTRUMENTATION

UNIT I

Measurement Systems and Characteristics Of Instruments: Introduction- Measurements, Significance of measurements, Methods of measurements, Instruments and measurement system, Electronic instruments, Classification of instruments, Deflection and Null type instruments, Comparison Analog and Digital Modes of operation, Application of measurement system, Errors in measurements, Types of errors, Accuracy and Precision, Noise, Resolution or discrimination, loading effects, Units, Absolute units, Fundamental and Derived units.
UNIT II


UNIT III


UNIT IV

Transducers: Principles of operation, Classification of transducers based upon principle of Transduction, Summary of factors influencing the choice of transducer, Qualitative treatment of Strain Gauge, LVDT, Thermocouple, Piezo-electric crystal and Photoelectric transducers.

UNIT V

Data Acquisition System and Telemetry: Introduction- Analog and digital data acquisition system, Methods of data transmission, General telemetry system, Types of telemetry systems.

Books Recommended
2. Kalsi H S “Electronic Instrumentation “
4. Cooper W D, Helfrick A D “Modern Electronic Instrumentation and Measurement Techniques”, PHI

Course No: ECE 304

NETWORK ANALYSIS

UNIT I


Unit II

UNIT III

UNIT IV

UNIT V

Books Recommended
1. Network analysis -M.E Van Valkenburg, PHI
2. Circuits and Networks – analysis & synthesis – A. Sudhakar & S P ShyamMohan
3. Network and Systems -D Roy Chaudhary
4. Network analysis and synthesis -Franklin F Kuo – John Wiley & Sons

Course No: ECE 305

DIGITAL ELECTRONICS AND LOGIC DESIGN

UNIT I
Number Systems And Boolean Algebra: Review of Number systems, Radix conversion, Complements 9’s&10’s, Subtraction using 1’s & 2’s complements, Binary codes, Error detecting and Correcting codes, Theorems of Boolean algebra, Canonical forms, Logic gates.

UNIT II
Digital Logic Families: Introduction to bipolar Logic families: RTL, DCTL, DTL, TTL, ECL and MOS Logic families: NMOS, PMOS, CMOS, Details of TTL logic family - Totem pole, open collector outputs, TTL subfamilies, Comparison of different logic families.

UNIT III
Combinational Logic: Representation of logic functions, Simplification using Karnaugh map, Tabulation method, Implementation of combinational logic using standard logic gates, Multiplexers and Demultiplexers, Encoders and Decoders, Code Converters, Adders, Subtractors, Parity Checker and Magnitude Comparator.

UNIT IV
Sequential Logic Concepts And Components: Flip flops - SR, JK, D and T flip flops - Level triggering and edge triggering, Excitation tables - Counters - Asynchronous and synchronous type Modulo counters, design with state equation state diagram, Shift registers, type of registers, circuit diagrams.
UNIT V

**Semiconductor Memories:** Memory organization, Classification, and characteristics of memories, Sequential memories, ROMs, R/W memories, Content Addressable memories, Charged-Coupled Device memory, PLA, PAL and Gate Array.

**Books Recommended**
6. Tocci Ronald J “Digital Systems-Principles and Applications” Prentice Hall of India, New Delhi

Course No: ECE 306

**LAB 1 – SOLID STATE DEVICE LAB**

2. Study V-I characteristics of:
   1. P-n junction diode.
   2. Zener diode.
   3. Tunnel diode.
   Calculation of DC and dynamic resistance in each case.
3. Study I/O characteristics of photodiode.
4. Study V-I characteristics of transistor (PNP and NPN). Calculate the performance parameters of transistor.
5. Study V-I characteristics of JFET and MOSFET. Determination of their performance parameters.

Course No: ECE 307

**LAB II – BASIC INSTRUMENTATION LAB**

1. To study the waveform on a storage oscilloscope.
2. To study the dynamic recording of different signals on oscilloscope recorders.
4. Measurement of small resistance by the Kelvin’s bridge.
5. Measurement of medium resistance with the help of Wheatstone bridge.
7. To find Q of a coil by a series resonance method and verify it by using Q-meter.
8. To study the recording of different signals from sensors on magnetic tape recorder.
10. Design of sweep generator.
11. Design/study of frequency synthesizer.
12. Design of digital voltmeters (Dual slope, successive approximation types)
13. Digital measurement of time interval, phase, period, frequency and ratio of two frequencies.
Course No: ECE 308

LAB III – NETWORK THEORY LAB

1. Verification of Thevenin’s theorem.
2. Verification of Norton’s theorem.
3. Verification of maximum power transfer theorem.
4. Verification of superposition theorem.
5. Verification of Reciprocity theorem.
6. Design and implementation of T and H passive filters.
10. Study of passive differentiator and integrator.
12. Verification of equivalence of star and delta transformation.

Course No: ECE 309

LAB IV – DIGITAL ELECTRONICS LAB

1. Interfacing of TTL and electromagnetic relay using transistor, opto coupler (4N33) and Darlington array (ULN2803).
2. Logic family interconnection (TTL to CMOS and CMOS to TTL).
3. Verification of the truth tables of TTL gates (7400, 7402, 7404, 7408, 7432, 7486…).
4. Verify the NAND and NOR gates as universal logic gates.
5. Verification of the truth table of the Multiplexer 74150.
7. Design and Verification of the truth table of half and full adder circuits.
8. Design and Verification of the truth table of half and full subtractor circuits.
10. Verify the truth table of a J-K F/F (7476).
11. Verify the truth table of a D F/F (7474).
12. Operate the counters 7490, 7493, and 74194. Verify the frequency division at each stage and with a low frequency clock (say 1 Hz) display the count on LED’s.
13. Verify the truth table of decoder driver 7447/7448. Hence operate a 7 segment LED display through a counter using a low frequency clock.
Course No: ECE 401

ENGINEERING MATHEMATICS - II

Unit I

Unit II

Unit III
Finite differences: meaning of ∆, ∇, E, μ, δ - interpolation using Newton’s forward and backward formula- central differences- problems using Stirling’s formula- Lagrange’s formula and Newton’s divided difference formula for unequal intervals.

Unit IV
Curve Fitting: Regression, Fitting Linear Equations, Fitting transcendental Equations, Fitting, polynomial function, Multiple linear regression, Solution of partial Differential equations, Deriving Difference Equations, Elliptic equations, parabolic equations, hyperbolic equations

Unit V

Books Recommended

Course No: ECE 402

SIMULATION TOOLS

Unit I
Unit II

MATLAB: Introduction, Interactive Computation, Scripts and Functions, Graphics, Applications

Unit III

Computer applications in Numerical analysis: Solving a linear system, Gaussian Elimination, Finding eigenvalues and eigenvectors, Curve fitting and Interpolation, Numerical Integration and Differentiation.

Unit IV


VHDL: Introduction, Entity, Architecture, Configuration Declaration, Generic, Data Objects, Examples of VHDL Codes.

Unit IV

Digital Design using VHDL, combinational and sequential logic design, applications of VHDL in digital design using FPGA and CPLD starter kits.

Books Recommended
1. Rudrapratab, Getting started with Matlab, Oxford University Press.

Course No: ECE 403

ELECTROMAGNETIC THEORY

Unit I

Electrostatic Fields: Divergence Theorem, Poisson’s and Laplace’s equation in various co-ordinate systems, solution of single dimensional Laplaces equation, Conditions at a boundary between dielectrics, Electrostatic uniqueness theorem, capacitance, Calculation of capacitance for simple rectangular, Cylindrical and spherical geometries. Effect of multi-layer dielectrics, Energy and Mechanical forces in electric fields, Method of Electrical images for a point charge in the neighborhood of infinite conducting plane, Application of image method for transmission line capacitance calculations.

Unit II


Unit III

Electromagnetic Waves: TEM, Derivation of the wave equation and their general solution. Plane waves in unbounded media, Reflection and refraction of plane waves at surface interface, surface impedance, Penetration of Flux and Current in a conductor, Transmission line analogy.
Poynting Vector and Flow of Power: Poynting’s theorem, Interpretation of \((E \times H)\) - vector, Instantaneous, Average and complex Poynting Vector, Power Loss in a plane conductor.

Unit IV

Guided Waves and Wave Guides: Characteristics of TE and TM waves, wave impedance, transmission line theory, impedance matching by means of stub lines, TE and TM waves in circular guides, Introduction to wave guides, Circuits, line and guides - a comparison, Rectangular and circular wave guides, TE and TM waves in rectangular wave guides, Impossibility of TEM waves in wave guides, Wave impedances and characteristics impedances, Transmission line analogy for wave guides, Attenuation and Q-factor of wave guides, Dielectric slab wave guides.

Unit V

Antenna Fundamentals: Directional properties of Dipole antennas, SW-antennas, Antenna gain, effective area, antenna terminal impedance, transmission loss between antennas, antenna temperature and S to N ratio, concept of space communication.

Books Recommended

Course No: ECE 404

ELECTRONIC CIRCUITS - I

UNIT I
Rectifiers and Power supplies: Half wave- full wave and bridge rectifiers- working- analysis and design- C filter analysis- regulated power supplies: series and shunt- design of regulated power supplies for specified output conditions- current limiting- short circuit protection- IC regulated power supplies.

UNIT II
Transistor as an amplifier: Transistor at low frequencies- h parameter model analysis-expression of voltage and current gain- input and output impedance- CE- CB and CC configurations-comparison- transistor parameters from static characteristics- FET: operation- characteristics- small signal model.

UNIT III
Transistor Biasing: operating point- DC and AC load lines- Q point selection- bias stability-definition of stability factors- derivation of stability factor for \(I_{CO}\) variation- fixed bias- collector to base bias- self bias circuits- bias compensation- compensation for \(I_{CO}\) and \(V_{BE}\).

UNIT IV
RC Coupled amplifier: working- analysis and design- phase and frequency response- FET amplifier: biasing- analysis and design.
UNIT V
Wave shaping circuits: clipping- clamping- RC integration - differentiation- transistor as a switch- astable multivibrator- working and design - UJT- working and applications- simple sweep circuit.

Books Recommended
4. Electronic devices and circuits: Bogart- UBS.
5. Electronic devices and circuits: Allen Mottershed- PHI.
7. Electronic devices and applications: B Somanathan Nair- PHI.

Course No: ECE 405

MICROPROCESSORS AND MICROCONTROLLERS

Unit I
History and Evolution, types of microprocessors, 8085 Microprocessor, Architecture, Bus Organization, Registers, ALU, Control section, Instruction set of 8085, Instruction format, Addressing modes, Types of Instructions.

Unit II

Unit III
Data transfer techniques, Programmed data transfer, Parallel data transfer using 8155. Programmable, parallel ports and handshake input/output, Asynchronous and Synchronous data transfer using 8251A. Programmable interrupt controller 8259A. DMA transfer, cycle stealing and burst mode of DMA, 8255, 8257 DMA controller, Interfacing memory and I/O devices, Addressing memory, interfacing static RAMs, Interfacing and refreshing dynamic RAMs, Interfacing a keyboard, Interfacing

Unit IV
Atmel AT89C51 microcontroller – features - pin configurations - internal block schematic - pin descriptions - PORT0, PORT1, PORT2, PORT3, idle & power down mode - power control register - program protection modes - flash programming & verification.

Unit V
Machine cycles – interrupts - interrupt sources - interrupt enable register - interrupt priority - interrupt control system - interrupt handling - single step operation - port bit latches and buffers - port structures and operation - accessing external memory – programming examples. Timer0 & Timer1 - TMOD SFR - mode0, mode1, mode2, mode3 - TCON SFR - serial interface - SCON SFR - mode0, mode1, mode2, mode3- block schematics- baud rates- power on reset circuit- ONCE mode- on chip oscillator- external program & data memory timing diagrams- I/O port timings – programming examples.
Books Recommended


Course No: ECE 406

MATERIAL SCIENCES

UNIT I
Crystal Structure: Fundamental concepts, Closed packed structures, Crystal systems,Crystallographic planes and directions, Miller indices, Point defects. Electrical Properties: Classical free electron theory of metals, Quantum theory – Particle in a box, Wave function and energy states, Finite potential barrier, Tunneling, Fermi-Dirac distribution law, Density of energy states, Kronig-Penney model, Classification of solids into conductors, Semiconductors and insulators, Zone schemes, Effective mass.

UNIT II

UNIT III

UNIT IV

UNIT V
Semiconductor Materials: Intrinsic and extrinsic materials, Electron and hole concentrations at equilibrium, Temperature dependence of carrier concentrations, Conductivity and mobility, Effect of temperature and doping on mobility, Direct and indirect recombination of electron and holes, Diffusion and drift of carriers, Diffusion length, Contact potential. Hall Effect and its Applications.

Books Recommended:


Course No: ECE 407

LAB 1 - ELECTRONIC CIRCUITS LAB

1. Interfacing of TTL and electromagnetic relay using transistor, opto coupler (4N33) and Darlington array (ULN2803).
2. Logic family interconnection (TTL to CMOS and CMOS to TTL).
3. Verification of the truth tables of TTL gates (7400, 7402, 7404, 7408, 7432, 7486…).
4. Verify the NAND and NOR gates as universal logic gates.
5. Verification of the truth table of the Multiplexer 74150.
7. Design and Verification of the truth table of half and full adder circuits.
8. Design and Verification of the truth table of half and full subtractor circuits.
10. Verify the truth table of a J-K F/F (7476).
11. Verify the truth table of a D F/F (7474).
12. Operate the counters 7490, 7493, and 74194.Verify the frequency division at each stage and with a low frequency clock (say 1 Hz) display the count on LED’s.
13. Verify the truth table of decoder driver 7447/7448. Hence operate a 7 segment LED display through a counter using a low frequency clock.

Course No: ECE 408

LAB II - MICROPROCESSOR LAB

1. Familiarization with 8085 trainer kit, manual code entry.
2. Programs using 8085 ALP on trainer kit and using simulators.
3. Writing and executing Basic 8085 ALP programs for Arithmetic and Logical Operations.
4. Writing and executing advanced 8085 ALP programs.
5. Programming examples using timer and external interrupts.
7. Interfacing of A/D converter and D/A converter modules with Microprocessor/Microcontroller.
8. Interfacing of Alphanumeric LCD display and Matrix keyboard interface modules with Microprocessor/Microcontroller.
9. Interfacing of Seven segment display and Stepper modules with Microprocessor/Microcontroller.

Course No: ECE 409

LAB III - SIMULATION LAB

1. Use CPLD XC 9572 kit to implement 2-input XOR gate and 8-input NAND gate.
2. Use CPLD XC 9572 kit to implement 3-input decoder, and 4-to-1 Multiplexer.
3. Use CPLD XC 9572 kit to implement Half Adder. and Full Adder using half adder component.
4. Use CPLD XC 9572 kit to implement 7-segment decoder and RS F/F.
5. Use CPLD XC 9572 kit to implement 4-bit counter and Decade counter.
7. Design, simulation and synthesis of an Odd parity generator for a 4-bit word.
9. Design, simulation and synthesis of a 3 to 8 line decoder.
10. Design, simulation and synthesis of a T F/F that toggles with falling edge of clock.
11. Design, simulation and synthesis of a 4-bit counter.
12. Design, simulation and synthesis of an SR F/F.
16. Design, simulation and synthesis of the following through the use EDA tools.
   i. V-I characteristics of diode, Zener diode, Tunnel diode, transistor, JFET and MOSFET.
17. Design, simulation and synthesis of the following through the use EDA tools.
   i. Diode as rectifier.
   ii. Zener diode as voltage regulator.
18. Design, simulation and synthesis of the following through the use EDA tools.
   i. Clipper and clamper circuits.
   ii. Transistor, JFET and MOSFET as amplifiers, oscillators, multivibrators etc.
19. Design, simulation and synthesis of the following through the use EDA tools.
   i. Applications of 555 timer.
   ii. Programming of various numerical methods using C-programming.
20. Writing programs using MATLAB for simulation (At least 10 Programs).
Course No: ECE 501

COMPUTER ORGANISATION AND ARCHITECTURE

Unit I
Basic structure of computer hardware and software- addressing methods and machine programming sequencing- different addressing modes- instruction sets- computer arithmetic logic design- fast adders- multiplication- Booth’s algorithm- fast multiplication- integer division- floating point numbers.

Unit II
Control unit- instruction execution cycle- sequencing of control signals- hardwired control- PLAs- micro programmed controls- control signals- micro instructions - Micro program sequencing- branch address modification- pre fetching of micro instructions.

Unit III

Unit IV

Unit V
Introduction to parallel processing and architecture- classification- array processors- pipeline architecture- interconnection- networks- multistage networks- message passing architecture.

Books Recommended
2. Computer organization and Architecture – Hayes J P
5. Computer organization and Design – Pal Choudhary

Course No: ECE 502

ELECTRONIC CIRCUITS - II

Unit I
High frequency equivalent circuit of a transistor. Hybrid pi model- explanation of components -r parameters in terms of h parameters -Tuned amplifiers -principle - single tuned and double tuned amplifiers -frequency response -applications (no analysis) -multistage amplifiers -frequency response.

Unit II
Feedback -different types -positive, negative, voltage, current, series and shunt feedback - Feedback in amplifiers -its effect on amplifier performance -typical feedback arrangements -emitter follower - darlington emitter follower -cascade amplifier (principles only) -difference amplifier.
Unit III
Oscillators -conditions for oscillation -analysis and design of RC phase shift oscillator, general form of oscillator circuit -working of Hartley, Colpitt's, Crystal, tuned collector and Wien Bridge oscillators.

Unit IV

Unit V
Large signal amplifier -harmonic distortion -analysis of class A, class B, class C and class D amplifiers -complimentary and symmetry stage -sweep generators -voltage and current sweeps -time base generators -linearisation -miller and bootstrap sweeps - applications.

Books Recommended
2. Integrated electronics -Millman & Halkias, Mc Graw Hill
3. Electronic principles -Malvino
4. Electronic devices and circuits -Bugart

Course No: ECE 503

SIGNALS AND SYSTEMS

Unit I

Unit II
Fourier Analysis of Continuous Time Signals and Systems - Fourier Series- Fourier Transform and properties- Parseval’s theorem- Frequency response of LTI systems. Sampling Theorem.

Unit III
Fourier Analysis of Discrete Time Signals & Systems - Discrete-Time Fourier series- Discrete-Time Fourier Transform (including DFT) and properties. Frequency response of discrete time LTI systems.

Unit IV

Unit V
Books Recommended

Course No: ECE 504

LINEAR INTEGRATED CIRCUITS

UNIT I
Introduction to operational amplifiers – Basic differential amplifier - dual input balanced output and unbalanced output- Internal block schematic of op amp - Pin identification- power supply requirements - typical data sheet - Op-amp parameters - ideal op amp - transfer curve - equivalent circuit- open loop configurations - frequency response of op amps - compensating networks - slew rate and its effect.

UNIT II
Op amp in closed loop configuration: Different feedback configurations- Voltage series feedback and voltage shunt feedback - concept of virtual ground- voltage follower - V/I converters and its applications - Differential amplifiers with one op amp and 3 op amps- Use of offset minimizing resistor (ROM) and its design.

UNIT III
DC and AC amplifiers, Peaking amplifiers, Summing, Scaling and Averaging amplifiers, Differential amplifier, Instrumentation amplifiers, V to I and I to V converters, Differentiator and integrator, A to D and D to A converters, Log and antilog amplifiers, Sample and hold circuits, Schmitt trigger

UNIT IV
Phase-shift & Wein bridge Oscillators, Square wave, triangular wave and saw-tooth wave generators, Voltage controlled oscillator. Specialised Ics: Phase Locked Loop- Operating principles and applications, Voltage Regulators - Fixed, adjustable and switching regulators, 555 Timer- its applications as Monostable and Astable multivibrators.

UNIT V

Books Recommended
2. Op amps and Linear Integrated circuits: R F Coughlin- Pearson Education.
5. Integrated circuits: K R Botkar
Course No: ECE 505

COMMUNICATION ENGINEERING

UNIT I


UNIT II


UNIT III

FM Transmission/FM Reception: Generation of FM by Direct Methods, Indirect Generation of FM; The Armstrong Method, FM Stereo Transmission. FM Receiver Direct Methods of Frequency Demodulation; Slope Detector, Travis Detector Foster Seely or Phase Discriminator, Indirect methods of FM Demodulation; FM Detector using PLL and Stereo FM Multiplex Reception.

UNIT IV


UNIT V

Pulse Modulation Transmission and Reception: Introduction, Pulse Amplitude Modulation (PAM), PAM Modulator Circuit, Demodulation of PAM Signals, Pulse Time Modulation (PTM); Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), PPM Demodulator. FSK, PSK.

Books Recommended

2. Gary M. Miller and Jeffery S. Beasley, “Modern Electronic Communications “, 7/e PHI.
Course No: ECE 506

LAB 1 - ELECTRONIC CIRCUITS LAB

1. Power amplifiers: Design of class A and class AB push-pull stage-verification of power output.
2. IC power amplifier.
4. Design of bootstrap sweep generator.
5. Schmitt trigger.
6. Feedback amplifier, design of two stage RC coupled amplifier.
7. Tuned amplifiers.
8. Study of h-parameters of a transistor.

Course No: ECE 507

LAB II - COMMUNICATION LAB

1. To study AM using a diode/transistor and determine the depth of modulation.
2. To study envelope detector for demodulation of AM signal and observe diagonal peak clipping effect.
3. Frequency modulation using VCO.
4. Study of PLL and detection of FM signal using PLL.
5. Generation of DSB-SC signal using balanced modulator.
8. Measurement of Noise Figure using a Noise generator.
9. Study the functioning of super heterodyne AM receiver.
11. Noise power spectral density measurement.

Course No: ECE 508

LAB III - LINEAR IC LABORATORY

1. Measurement of op-amp parameters - CMRR, slew rate, open loop gain, input and output impedances.
2. Inverting and non-inverting amplifiers, integrators and differentiators – frequency response.
3. Instrumentation amplifier - gain, CMRR and input impedance.
4. Single op-amp second order LPF and HPF - Sallen-Key configuration.
5. Narrow band active BPF - Delyianmis configuration.
6. Active notch filter realization using op-amps.
7. Wein bridge oscillator with amplitude stabilization.
8. RC phase shift oscillator.
10. Square, triangular and ramp generation using op-amps.
11. Astable and monostable multivibrators using IC 555.
12. Linear sweep generation using IC 555.
13. Design of PLL for given lock and capture ranges & frequency multiplication.
15. Log and Antilog Amplifiers.
16. Sample and Hold Circuit.
17. Analog-to-Digital Converter.
18. Digital-to-Analog Converter.
19. study of &*XX and &(XX series of voltage regulators.
20. Study of 317 variable voltage regulator.
22. Applications of PLL.

Course No: ECE 509

LAB IV - COMPUTER ORG AND MICROCONTROLLER LAB

1. Design of computer arithmetic circuit.
2. DOS/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.
3. Writing C/assembly programs for low level device access of PCs.
4. Design and construction of a simple flash programmer for 89C51/89C2051 µC.
5. Computer aided assembly language program development for 89C51/89C2051.
6. Use of assembler, linker and simulator for 89C51/89C2051.
8. Programming examples using Embedded ‘C’ compiler for 89C51/89C2051.
10. Design and construction of the following interfacing modules.
   (i) A/D converter.
   (ii) D/A converter.
   (iii) Alphanumeric LCD display.
   (iv) Matrix keyboard interface.
   (v) Seven segment display.
   (vi) Extending I/O port using shift registers (74HC595, 74HC165).
   (vii) Stepper motor.
   (viii) Infra red transmission and reception.
   (ix) Opto isolated I/P and O/P.
   (x) Serial EEPROM.
   (xi) Real time clock.
   (xii) Interfacing using RS 232 and printer port.
SEMESTER – 6

Course No: ECE 601

MICROWAVE TECHNIQUES AND DEVICES

UNIT I


UNIT II


UNIT III

Microwave Semiconductor Devices: Classification of Microwave Devices, Point Contact diode; Tunnel Diode; Gunn Diode, two valley structures, mode of operation, circuit realization. IMPATT Diode, read Diode, circuit realization. PIN diode, basic principles of operation equivalent circuit, and application as switch, modulator and Phase shifter. Microwave Bi-polar and Field effect Transistors-Characteristics and performance. Parametric amplifiers.

UNIT IV


UNIT V


Books Recommended


Course No: ECE 602

POWER ELECTRONICS

UNIT I

Power semiconductor Devices - History of development of Power Electronic devices- Constructional features- Characteristics- rating and specification- gate/base drive circuits-protection including cooling and application consideration of diodes- SCRs, GTO, BJTS, MCT, MOSFET and IGBT. Series and parallel operations of SCR- Electromagnetic interference.
UNIT II
AC to DC Converters - Operation and analysis of Single phase and multi-phase uncontrolled and controlled rectifiers with R, RL and back EMF load- effect of source inductance- free wheeling effect- power factor improvement methods for phase Controlled rectifiers- filters. PWM chips: SG3524 and TL 494- Block schematic.

UNIT III
AC to AC Voltage Converter - Operation and analysis of single phase integral cycle and phase controlled converters- Configuration of three phase controllers.

UNIT IV
DC to DC Converters - Chopper classification- Step down- step up and four quadrant converters operation- analysis and control with R, RL and EMF load- current and voltage Commutation circuits.

UNIT V
DC to AC Converters - Single phase and three phase bridge inverters- VSI and CSI- voltage control - PWM & Square wave operation- Harmonics and their reduction techniques.

Books Recommended
3. Thyristors and Applications: Ramamoorthy.
4. Power Electronics: Converter, Applications and Design, Mohan Ned, John Wiley,

Course No: ECE 603

DIGITAL SIGNAL PROCESSING

UNIT I
Introduction: Limitations of analog signal processing, Advantages of digital signal processing and its applications; Some elementary discrete time sequences and systems; Basic elements of digital signal processing such as convolution, correlation and autocorrelation, Concepts of stability, causality, linearity, difference equations

UNIT II
Frequency Domain Representation of Discrete Time Signal and Systems: Complex exponentials as Eigen functions of LTI systems; Fourier Transform of sequences. Fourier Transform theorems and symmetry properties of Fourier Transform. Sampling of Continuous Time Signals: Sampling and aliasing problem, Reconstruction of a continuous time signal from its samples; Discrete Time Processing of Continuous time signals and vice-versa. Decimation & Interpolation; changing the sampling rate by integer and non-integer factors using discrete time processing.

UNIT III
The Z Transform: Z-Transform, Region of convergence; Properties of the Z-transform; convolution theorem; Parseval’s relation; Unilateral Z-transform and its application to difference equations with nonzero initial condition.
UNIT IV

**Discrete Fourier Transform:** DFT and its properties; Linear Periodic and Circular convolution; Linear Filtering Methods based on DFT; Filtering of long data sequences; Fast Fourier Transform algorithm using decimation in time and decimation frequency techniques; Linear filtering approaches to computation of DFT.

UNIT V

**Design of Digital Filters:** Linear Phase FIR filters; Design methods for FIR filters; IIR filter design by Impulse Invariance, Bilinear Transformation, Matched Z-Transformation, Frequency Transformation in the Analog and Digital Domain. **Finite Precision Effects:** Fixed point and Floating point representations, Effects of coefficient unitization, Effect of round off noise in digital filters, Limit cycles.

Books Recommended

6. Andrias Antonion, “Digital

Course No: ECE 604

**ADVANCED MICROPROCESSORS**

Unit I


Unit II

Introduction to Programming, Various level of Programming, Instruction set of 8086 Microprocessor, Data transfer instructions, Arithmetical and Logical instructions, Branch Instructions, Processor control instruction, String operation instructions. Assembly language Programming, use of Procedures and Macros in ALP, input/output using Interrupts, Use of various types of sequence control instructions,

Unit III

Unit IV

Unit V

Books Recommended

Course No: ECE 605

DIGITAL COMMUNICATION

Unit I
Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Comping in PCM systems. Differential PCM systems (DPCM). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT II
Introduction, ASK, FSK, PSK, DPK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK. Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK,QPSK.

Unit III
Discrete messages, concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties, Introduction to source coding, Advantages, Shannon’s theorem, Shannon-Fano coding, Huffman coding, efficiency
calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

Unit IV
Introduction to LINEAR BLOCK CODES, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes. Introduction to CONVOLUTION CODES, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

Unit V

Books Recommended
1. Digital Communication By Simin Hykin,
2. Digital and Analog Communication by K. Shan Mugam.
3. Digital and Analog Communication by Tomasi,
4. Telecommunication Switching Systems and Networks by T. Viswanthan, PHI.
5. William stallings - Data and Computer Communication (4th ed.)- PHI
6. Larry Hughes - Introduction to Data Communication - a practical approach - Jones and Bartlett Publishers

Course No: ECE 606

CONTROL SYSTEM ENGINEERING

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

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

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

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

Unit V
Introduction to control system design - preliminary considerations - lead, lag and lead - lag compensation, Design of lead compensators and lag compensators. Elements of discrete control systems - transfer functions of discrete data systems stability of closed loop discrete system - jury’s test bilinear transformation method.
Books Recommended

1. I J Nagarath and M.Gopal - Control Systems Engineering - New Age International Ltd. - New Delhi
2. B.C Kuo - Automatic Control Systems-Prentice Hall of India - New Delhi
3. K Ogata - Modern Control Engineering - Prentice hall of India - New Delhi

Course No: ECE 607

LAB 1 – (A) POWER ELECTRONICS LAB

1. SCR characteristics
2. Triac and Diac characteristics
3. Phase controlled rectifier-resistance triggering
4. Phase controlled rectifier- UJT triggering
5. Chopper circuits
6. Simple DC to AC inverter circuit
7. Driven DC to AC inverter using MOSFET & IC
8. IGBT characteristics
9. Inverter circuit using IGBT
10. Digital triggering circuit for phase controlled rectifiers
11. Application of ICS: PWM IC TL 494, optocoupler IC -MCT2E
12. AC phase controlled using triac.
13. To control the speed of DC motor using TRAIC.

LAB 1 – (B) MICROWAVE LAB

14. Study of Microwave components and Instruments
15. To study the characteristics of reflex Klystron
16. Tuning of Klystron Mechanical and Electronics Methods
17. To study the Characteristics of Crystal Detector.
18. To measure the Frequency using direct reading frequency meter and compare it with indirect frequency meter.
19. To measure VSWR, Insertion loss and attention of fixed and variable attenuator
20. Measurement of Directivity and Coupling coefficient of an directional coupler
21. To plot and study the V-I characteristics of a Gunn diode
22. To match impedance for maximum power transfer using a slide screw tuner
23. calibration of the attenuation constant of an attenuator
24. Determination of a radiation Characteristics and gain of an antenna

Course No: ECE 608

LAB II – (A) ADVANCED MICROPROCESSOR LAB

1. ALPs for basic arithmetic and logical operations on 8, 16 and 32 bit numbers.
2. ALPs for solving basic computing problems like sorting, series, factorial, GCD, LCM, Number conversions, etc.
3. Use of MS DOS debug, inline C Assembly instructions, MASM and TASM for ALP of x86 Microprocessors.
4. ALPs involving operations on BCD numbers.
5. ALPS involving string operations.
6. Using of macros and procedures in ALPs.
7. ALPs involving File and Directory operations.
8. ALPs involving date and time operations.
9. Writing of TSR ALPs.
10. Interfacing and use of 8255 in various I/O modes.
11. Interfacing of A/D convertor and D/A Convertor.
12. Interfacing of Stepper motor and LED/LCD Modules.
13. Writing programs using ALPs of 16 and 32 bit processors.

LAB II – (B) DSP LAB

15. Write a program in Matlab to generate standard sequences.
16. Write a program in Matlab to compute power density spectrum of a sequence.
17. To write a Matlab program for noise reduction using correlation and autocorrelation methods.
18. Write a program in Matlab to verify linear convolution.
19. Write a program in Matlab to verify the circular convolution.
20. To write a Matlab programs for pole-zero plot, amplitude, phase response and impulse response from the given transfer function of a discrete-time causal system.
21. Write a program in Matlab to find frequency response of different types of analog filters.
22. Write a program in Matlab to design FIR filter (LP/HP) through Window technique
   a. Using rectangular window
   b. Using triangular window

Course No: ECE 609

LAB III - DIGITAL COMMUNICATION LAB

1. To study and observe waveform of FSK Modulation and demodulation.
2. To study the characteristics of second order Band pass filter
3. To study sampling and time division Multiplexing and demultiplexing.
4. To study the characteristics of Gaussian noise and to measure its spectrum height in the frequency band over which its spectral density is flat.
5. To study delta modulation and demodulation.
6. To observe the time domain and spectral Characteristics of the waveform of BPSK, QPSK and offset-QPSK, to build modulators for them and measure their BER Performance with ideal receivers.
7. To implement the optimal receiver for 4- PAM and 16 QAM modulated signals, study the spectral characteristics of PAM, QAM and measure their BER performance.
8. Study of pulse code modulation (PCM) and demodulation.
9. Study of delta modulation and demodulation and observe the effect of slope overload.
10. study of pulse data coding techniques for NRZ formats.
11. Data decoding techniques for NRZ formats.
Course No: ECE 701

EMBEDDED SYSTEM

UNIT I

Embedded Processing Systems – Introduction, Components of Embedded Systems, Embedded Processors: Microprocessors, Microcontrollers, DSP and ASICs, Comparative Assessment of Embedded Processors

UNIT-II

Pipelining, Memory Devices: ROM family, RAM family, Interfacing memory, Embedded Programming - C and C++, Programming languages for embedded systems: desirable, characteristics of programming languages for embedded systems, low-level versus high-level languages, Input-output Ports and Interfacing, I/O Programming

UNIT-III


UNIT-IV

I/O Management and Device Drivers, Software Engineering Practices: Embedded Software development process

UNIT-V

Hardware-Software Co-design in an embedded system, Tools and Trends in Embedded systems design

Recommended Books

Course No: ECE 702

VLSI TECHNOLOGY - I

Unit I

Process steps in IC fabrication: Crystal growth and wafer preparation- Czochralski process-apparatus- silicon shaping, slicing and polishing- Diffusion of impurities- physical mechanism- Fick’s I and II law of diffusion- Diffusion profiles- complementary (erfc) error function- Gaussian profile-Ion implantation- Annealing process
Unit II
Oxidation process- Lithography- Photolithography, Fine line lithography, electron beam and x-ray lithography- Chemical vapour deposition (CVD)- epitaxial growth- reactors- metallisation-patterning- wire bonding and packaging.

Unit III

Unit IV
CMOS technology: Metal gate and silicon gate- oxide isolation- Twin well process- Latch up- BiCMOS technology- fabrication steps- circuit design process- stick diagrams- design rules- Capacitance of layers- Delay- Driving large capacitance loads- Wiring capacitance- Basic circuit concepts- scaling of MOS structures- scaling factors- effects of miniaturization.

Unit V
Subsystem design and layout- Simple logic circuits- inverter, NAND gates, BiCMOS circuit, NOR gates, CMOS logic systems – bus lines- arrangements- power dissipation- power supply rail distribution- subsystem design process- design of a 4 bit shifter.

Books Recommended
2. Basic VLSI design: Douglas Pucknell, PHI.
5. CMOS circuit design layout and simulation: Barter, IEEE press.

Course No: ECE 703

ADVANCED INSTRUMENTATION

UNIT I
Functional descriptions of measuring Instruments-Functional elements of an Instrument, active and passive transducers, analog and digital modes of operation, null and deflection methods, static and dynamic characteristics.

UNIT II
Basic methods of force measurement- characteristics of elastic force transducers, resolution of vector forces and moments in to rectangular components

UNIT III
Measurement viscosity of density, specific gravity scales used in petroleum industries- Different methods of measuring consistency and viscosity –Methods for measuring moistrates and humidity – Electrical conductivity – Dielectric constant-Automatic electric psycho meter

UNIT IV
UNIT V
Power plant instrumentation- Diesel electrical power plants, Gas turbine power plants, gas and steam turbines combined cycles, nuclear reactors, fluctuating loads on power plants. Instrumentation and control of power plants.

Books Recommended
4. ECKMAN: Industrial Instrumentation- Wiley Eastern

Course No: ECE 704

COMPUTER NETWORKS

Unit I
OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT - II
Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrow band, broad band ISDN and ATM.

UNIT - III
Design issues of Data Link layer, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Slip, Data link layer in HDLC, Internet, ATM, ALOHA, MAC addresses, Carrier sense multiple access. IEEE 802.X, Standard Ethernet, wireless LANS. Bridges,

UNIT - IV

UNIT – V

Books Recommended
Course No: ECE 705

Elective I – ECE 705I

FIBER OPTIC COMMUNICATIONS

UNIT I
Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, Vnumber, Mode coupling, Step Index fibers, Graded Index fibers.

UNIT II
Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. Fiber materials. Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses.

UNIT III

UNIT IV

UNIT V
Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photodetectors, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers. Optical system design — Considerations, Component choice, Multiplexing, Point-to- point links, System considerations, Overall fiber dispersion in Multi mode and Single mode fibers, Transmission distance, Line coding in Optical links, Measurement of Attenuation and Dispersion, Eye pattern.

Books Recommended
Elective I – ECE 705II

DIGITAL IMAGE PROCESSING

Unit I

Unit II
Image enhancement: Spatial domain methods: point processing - intensity transformations, histogram processing, image subtraction, image averaging; Spatial filtering- smoothing filters, sharpening filters. Frequency domain methods: low pass filtering, high pass filtering, homomorphic filtering. Generation of spatial masks from frequency domain specifications.

Unit III

Unit IV

Unit V
Image segmentation: Detection of discontinuities - point, line and edge and combined detection ; Edge linking and boundary description - local and global processing using Hough transform – Thresholding - Region oriented segmentation - basic formulation, region growing by pixel aggregation, region splitting and merging - Use of motion in segmentation. Fundamentals of Representation and Description.

Books Recommended
5. Chanda & Majumdar, “Digital Image Processing and Analysis”, PHI.
Elective I – ECE 705III

FUNDAMENTALS OF RF DESIGN

UNIT I


UNIT II

Active RF Component and Modelling: Semiconductor Basics, RF Diode, Bipolar Junction Transistor, RF Field Effect Transistors, High Electron Mobility Transistor, Diode Models, Transistor Models

UNIT III

Matching & Biasing Network & RF Filter: Overview of RF Filter design, Matching and Biasing Networks. Basic blocks in RF systems and their VLSI implementation, Low noise, Amplifier design in various technologies, Design of Mixers at GHz frequency range, various mixers- working and implementation. Oscillators- Basic topologies VCO and definition of phase noise, Noise power and trade off. Resonator VCO. designs, Radio frequency Synthesizers- PLL, Various RF Synthesizer architectures and frequency dividers, Power Amplifier design, Design issues in integrated RF filters.

UNIT IV

RF Transistor Amplifier: Characteristics of Amplifiers, Amplifiers Power Relation, Stability Considerations, Constant Gain, Noise Figure Circles, Constant VSWR Circles, Broad Band, High Power and Multistage Amplifiers

UNIT V

Oscillators and Mixers: Basic Oscillator Model, High Frequency Oscillator Configuration, Basic Characteristics of Mixers.

Books Recommended
1. Reinhold Ludwig, Pavel Bretchko,”RF Circuit Design”,1st Indian Reprint,2001,Pearson Education Asia

Elective I – ECE 705IV

OPERATING SYSTEMS

Unit I

Unit II

Unit III

Unit IV

Unit V

Books Recommended

Elective I – ECE 705V

LOW POWER DESIGN

UNIT-I
Introduction: Introduction to Low-Power VLSI Design, sources of Dissipation in Digital Integrated circuit, Degree of freedom, Recurring Themes in Low power, Low Power Approaches,
UNIT-II

**Device and Technology Impact on Low Power Electronics:** Dynamic Dissipation in CMOS, Effect on Speed, Constrictions on Reduction, Transistor Sizing and Gate oxide Thickness, Impact of Technology Scaling

UNIT-III

**Low Power Circuit Techniques:** Power consumption in circuits, Flip-Flop and Latches, Logic, High Capacitance Nodes

UNIT-IV

**Low Power Clock Distribution:** Power Dissipation in clock Distribution, Single Driver vs Distributed Buffer, Zero Skew vs Tolerable Skew, Chip and Package Co-Design of clock.

UNIT-V

**Logic Synthesis for low power:** Power Estimation Technique, power Minimization Technique. **Low power Memory Design:** Sources of power dissipation in D-RAM and S-RAM, Low power DRAM circuit, Low power SRAM circuit

**Books Recommended**


**Course No: ECE 706**

**INDUSTRIAL TRAINING**

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

**Course No: ECE 707**

**LAB 1 – (A) NETWORKING LAB**

1. Experiments on use of Computer Network.
2. User Account management on a computer network
3. Experiments on resource shearing
4. Experiments on communication in a computer network.
5. Configuring a Network Operating System for DHCP, various services, FTP, Telnet, Active Directory, etc.
7. Writing of Socket programs
LAB 1 – (B) ELECTIVE I LAB

ECE 705 I  FIBRE OPTIC COMMUNICATION LAB
Experiments on the following topics:
1. To setting up fiber optic analog link.
2. Study of losses in optical fiber.
3. Study of numerical aperture of optical fiber.
4. Study of time division multiplexing (digital).
5. Study of framing in time division multiplexing.
7. Study of voice coding and codec chip.
8. Study of characteristics of fiber optic LED’s and photo detector.

ECE 705 II  DIGITAL IMAGE PROCESSING LAB
Experiments on the following topics:
1. Image fundamentals.
2. Image processing and display.
3. Image processing algorithms.
4. Image formation and image reconstruction.
6. Image transforms.
7. Gray levels and transformations.
8. Image enhancement
9. Image filtering
10. Image restoration
12. Image segmentation and Input-Output File handling

ECE 705 III  FUNDAMENTALS OF RF DESIGN LAB
Experiments on the following topics:
Use of Computer-Aided Design to:
1. Microwave Filter Design
2. Simulation and Application of Microwave components: Wire, Resistors, Capacitors, Inductors, Diodes, Transistors, MESFET, MODFET/HEMT
3. High frequency Amplifier Design.
4. Small Signal RF Amplifier Design
5. RF Power Amplifiers
6. Large Signal Amplifiers

ECE 705 IV  OPERATING SYSTEMS LAB
Experiments on the following topics:
1. Basic Concepts:
2. Operating System Structure
3. Process Management
4. Memory Management
5. Distributed Operating Systems
6. Protection And Security

ECE 705 V  LOW POWER DESIGN LAB
Experiments on the following topics:
1. Power Dissipation Measurement in Digital Integrated circuits
2. Design of low power circuits
3. Low power Memory Design
Course No: ECE 708

LAB II – EMBEDDED SYSTEMS LAB

1. Study A/D Converter and Analysis of External input using A/D converter and Display the result on LCD.
2. Study D/A Converter, Waveform generation i.e. ramp wave, step wave, square wave, triangular wave.
3. Display the status of 4-bit Keyboard switches on LCD and interface the LCD with micro-controller to display data or character string.
4. Study the 7-segments Display, Digital clock, counter (0-9) and (0-99).
5. Study the L.E.Ds, check the status of any ports, add two numbers and display the result on L.E.Ds, multiply the two numbers and display the result on L.E.Ds
6. Study the Relay Switch and perform switching of relays to turn ON/OFF.
7. Study the Buzzer operation by using the micro-controller.
8. Study the stepper motor.

Course No: ECE 709

LAB III - INSTRUMENTATION LAB

1. Study of dead weight tester and calibration of pressure gauge
2. Measurement using LVDT
3. Measurement using
   i. strain gauge
   ii. pressure transducer
4. Measurements using Photocell/LDR
5. Temperature measurement using RTD
6. Temperature measurement--using thermocouple--using diode
7. Measurement of distance using ultrasonic method
8. Measurement of PH and viscosity
9. Measurement of level
10. Flow measurement
Detailed Syllabus of B. Tech. (ECE), P. G. Department of Electronics & IT, University of Kashmir
Unit II

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

Unit III

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

Unit IV

Current Mode Filters: Current mode approach, Areas of Applications, Current mode amplifiers, Current conveyors, Current feedback amplifier, Current mode filter design

Unit V

Sensitivity study, Sensitivity function, magnitude and pass sensitivities, single parameter sensitivity, multiple parameter sensitivity, gain sensitivity, root sensitivity, general relation of network function sensitivities. The MOS switch, The Switched capacitor/resistor equivalence, analysis of switched capacitor filter using charge conservation equations, switched capacitor biquads, design example, Use SPICE and Micro-Sim in Analysis and of Filters.

Books Recommended

1. Passive and Active Filter Theory and Implementation, Wai Kai Chen,, John Wiley and Sons, 1986

Course No: ECE 803

ELECTIVE – II

Elective II – ECE 803I

ASIC DESIGN

Unit I

Introduction to ASICs: - Types of ASICs - Design flow - CMOS logic: CMOS transistors CMOS Design rules - Combinational Logic Cell -Sequential logic cell - Data path logic cell – I/O cells - ASIC library design: Transistors as Resistors - Transistor Parasitic Capacitance-Logical effort.

Unit II

Unit III

Unit IV

Unit V
ASIC construction: System partition - FPGA partitioning - partitioning methods - Floor planning and placement: floor planning - placement - physical design flow. Routing: global routing – detailed routing - special routing - circuit extraction - DRC.

Books Recommended

Elective II – ECE 803II

ROBOTICS AND COMPUTER VISION

UNIT I

UNIT II
Kinematics of Manipulators Link parameters Link frame assignment and forward kinematics Inverse manipulator kinematics Velocities and static forces Velocity transformation Force control system Interfacing computers to Robots RS 232 Interface Hardware Handshaking Software Handshaking RS 232 communication.

UNIT III

UNIT IV
Optics - Lens Equation Image Resolution Depth of Field View Volume Exposure Shading Image radiance Surface orientation Reflectance Map Shape from Processing Color constancy : Statistical methods of Texture analysis- Structural analysis of Ordered Texture Model based methods for Texture analysis Shape from Texture Depth stereo imaging Stereo matching Shape from X-Range Imaging Active Vision.
UNIT V

Dynamic Vision Change Detection Segmentation using motion Motion Correspondence Image flow Segmentation using a moving camera Tracking Shape from motion Object recognition System components Complexity of Object Recognition Object Representation Feature Detection Recognition Strategies Verification.

Books Recommended
5. Rembold and others, " Computer Integrated Manufacturing,

Elective II – ECE 803III

BIO-MEDICAL INSTRUMENTATION

UNIT I

ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING :The origin of Bio-potentials; biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT II

BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT :PH, PO2, PCO2, PHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III

ASSIST DEVICES AND BIO-TELEMETRY :Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Bio-telemetry, radio-pill and tele-stimulation.

UNIT IV

Respirator and pulmonary measurements and rehabilitation: Physiology of respiratory system, respiratory rate measurement, artificial respirator, oximeter, hearing aids, functional neuromuscular simulation, physiotherapy, diathermy, nerve stimulator, artificial kidney machine

UNIT V

Recent trends: Medical imaging, X-rays, laser applications, ultrasound scanner, echo cardiography,CT Scan MRI/NMR, cine angiogram, colour doppler systems, Holter monitoring, endoscopy.
Books Recommended

Elective II – ECE 803IV

PARALLEL COMPUTATION AND ARCHITECTURE

Unit I

Unit II

Unit III

Unit IV

Unit V

Books Recommended
Detailed Syllabus of B. Tech. (ECE), P. G. Department of Electronics & IT, University of Kashmir

Elective II – ECE 803V

ANALOG IC DESIGN

UNIT-I

Review of MOS Devices: MOS transistor models. NMOS, PMOS, CMOS, Introduction to analog VLSI and mixed signal issues in CMOS technologies, Basics of system hardware design methodology: Hierarchical design using top-down and bottom-up methodology

UNIT-II

Basic Electrical Properties And Circuit Concepts: Basic Electrical Properties of MOS circuits: MOS transistor operation in linear and saturated regions, MOS transistor threshold voltage, MOS switch and inverter, latch-up in CMOS inverter; sheet resistance and area capacitances of layers, wiring capacitances MOS models, SPICE Models

UNIT-III

Circuit Characterization and Performance Estimation: Estimation of R, C, L, Switching Characteristicsdelay models. Power dissipation. ; MOSFET scaling - constant-voltage and constant-field scaling

UNIT-IV

CMOS Analog blocks: Current Sources and Voltage references. Differential amplifier and OPAMP design.

UNIT-V


Books Recommended

Detailed Syllabus of B. Tech. (ECE), P. G. Department of Electronics & IT, University of Kashmir
interference algorithm, application of fuzzy logic, Fuzzy system design implementation, useful tools supporting design.

Unit II


Unit III

Basic Learning laws, Hebb’s rule, Delta rule, widrow and Hoff LMS learning rule, correlation learning rule instar and ouster learning rules.

Unit IV


Unit V

**Introduction to Counter propagation Networks:** CMAC Network, ART networks, Application of NN in pattern recognition, optimization, Control, Speech and decision making.

Books Recommended

3. Patterson Dan W, “Introduction to artificial Intelligence and Expert systems”, 3rd Ed., PHI
4. Simon Haykin, “Neural Networks” Pearson Education.
5. Yen and Langari, “Fuzzy Logic: Intelligence, Control and Information”, Pearson Education.

Elective III – ECE 804II

**COMPUTERIZED PROCESS CONTROL**

Unit I

Programmable Logic Devices: Basic Concepts- Programming Technologies. Programmable Logic Array (PLA)- Programmable Array Logic (PAL)- Design and Application

Unit II

Programmable Logic Controllers: Combinational logic controllers, sequential logic controllers, logic controller design using programmable logic devices, Introduction to programmable logic controllers - PLC programming languages, Commercially available PLCs, Microprocessor based PLCs.

Unit III

Distributed Control Systems - Basic packages, cost estimating, data highways – field buses, multiplexers and remote terminal units, CRT displays, flow sheet symbols, I/O hardware and setpoint stations.
Unit IV  
Distributed Control Systems: Supervisory computer tasks and configurations, system integration with PLCs and computers, Fibre-Optic local area networks: MAP and TOP, Fieldbuses, MAP, TOP.

Unit V  
Network protocols: Printers, Operator interfaces, workstations, wiring practices and signal conditioning, communication systems, case study- Allen-Bradley Protocol (AB Protocol)

Books Recommended  
1. Enrique Mandado, Jorge Marcos, Serafin A Perrez, - Programmable Logic Devices and logic Controllers - Prentice Hall- 1996  

Elective III – ECE 804III  
MECHATRONICS

UNIT I  
Rotational drives - Pneumatic Motors: continuous and limited rotation - Hydraulic Motors: continuous and limited rotation - Brushless DC Motors - Motion converters, Fixed ratio, invariant motion profile, variators, remotely controlled couplings Hydraulic Circuits and Pneumatic Circuits.

UNIT II  
Mechanical Systems and Design - Mechatronic approach - Control program control, adaptive control and distributed systems - Design process - Types of Design - Integrated product design - Mechanisms, load conditions, design and flexibility Structures, load conditions, flexibility and environmental isolation – Man machine interface, industrial design and ergonomics, information transfer from machine to man and man to machine, safety.

UNIT III  
Real time interfacing - Introduction Elements of data acquisition and control Overview of I/O process - Installation of I/O card and software - Installation of application software- Overframing.

UNIT IV  
Case studies on Data Acquisition - Testing of transportation bridge surface materials - Transducer calibration system for Automotive applications Strain Gauge weighing system - Solenoid force - Displacement calibration system - Rotary optical encoder - Inverted pendulum control - Controlling temperature of a hot/cold reservoir - Pick and place robot - Carpark barriers.

UNIT V  
Case studies on Data Acquisition and Control - Thermal cycle fatigue of a ceramic plate - pH control system - De-Icing Temperature Control System - Skip control of a CD Player - Autofocus Camera, exposure control. Case studies on design of Mechatronic products - Motion control using D.C. Motor, A.C. Motor & Solenoids - Car engine management - Barcode reader.

Books Recommended  
Elective III – ECE 804IV

TRANSDUCERS AND RECORDING SYSTEMS

Unit I
Transducers - definition and classification, Electrical transducers, selecting a transducer. Temperature measurements: standards and calibration, thermal expansion methods - bimetallic thermometers, liquid in glass thermometers, vapour pressure thermometers.

Unit II
Termocouple - principle, fundamental laws, reference junction considerations, types of thermocouples, industrial thermocouples, thermopiles. Resistance temperature detectors - Principle measurements using three wire and four wire bridge circuits, solid state sensors, quartz thermometers, optical pyrometers, digital thermometers.

Unit III
Displacement transducers: variable resistance transducers, variable inductance transducers, LVDT - construction, principle, characteristics, advantages, Variable capacitance transducers, piezoelectric transducers, digital displacement transducers.

Unit IV
Strain measurements: strain gauges - different types, resistive- semiconductor and optical strain gauges, strain gauge circuits, temperature compensation, Practical Applications

Unit V
Recorders: Strip chart recorders, galvanometric recorders, servo recorders, oscillographic recorders, magnetic recorders, direct recording, FM recording, digital recorders, electro mechanical recorders.
Display devices, Classification of displays, cathode ray tube, LEDs in direct and indirect bandgap materials, typical uses of LEDs, Liquid crystal displays, theory of liquid crystal display operation, typical use of LCDs.

Books Recommended
1. Beckwith: Mechanical Measurements 5/e, Pearson Education
2. D V S Murthy, Transducers and Instrumentation, prentice Hall of India Pvt. Ltd., New Delhi
Elective III – ECE 804V

DESIGN AND ANALYSIS OF ALGORITHMS

Unit I
Computational complexity: average and worst-case analysis, time and space complexity, notion of optimality. Examples: Finding the largest and second largest entries in a list, the Tournament Method, recursive algorithms, conversion to non-recursive algorithms.

Unit II

Unit III
Biconnectivity, strong connectivity and path finding algorithms: Breadth first search and depth first search.

Unit IV
Basic concepts, Multistage graphs, All pairs shortest paths, Optimal binary search trees, travelling salesman problem, O/I knapsack, flow shop scheduling.

Unit V

Books Recommended

Elective III – ECE 804VI

MOBILE COMMUNICATION

UNIT-I
Introduction to Cellular Mobile Systems: A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, analog & digital cellular systems. Elements of Cellular Radio Systems Design: General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems.

UNIT-II
Interference: Introduction to co-channel interference, real time co-channel interference co-channel measurement design of antenna system, antenna parameter and their effects, diversity receiver in co-channel interference – different types.

UNIT-III
Cell Coverage for Signal & Traffic: General introduction, obtaining the mobile point to point mode, Radio propagation characteristics: models for path loss, shadowing and multipath fading,
propagation over water or flat open area, foliage loss, propagation near in distance, long distance propagation, point to point prediction model characteristics, cell site, antenna heights and signal coverage cells, mobile to mobile propagation.

UNIT-IV

Cell Site Antennas and Mobile Antennas: Characteristics of antennas, antenna at cell site, mobile antennas Frequency Management, Channel Assignment and hand off: Frequency management, fixed channel assignment, non-fixed channel assignment, traffic & channel assignment, Why hand off, types of handoff and their characteristics, handoff analysis, dropped call rates & their evaluation.

UNIT-V

Multiple access techniques used in mobile wireless communications: FDMA/TDMA, CDMA. FDM/TDM Cellular systems, Cellular CDMA, soft capacity, Earlang capacity comparison of FDM/TDM systems and Cellular CDMA. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling, Frequency allocation and control, Base System and Master System, GSM, DCS 1800, Various value added services.

Books Recommended
1. Wireless Communication; Principles and Practice; T.S.Rappaport
2. Mobile Communication
4. Wireless and Digital Communications; Dr. Kamilo Feher (PHI)
6. Mobile Communication Engineering – Theory & Applications; TMH

Course No: ECE 805

LAB I - (A) VLSI LAB

Experiment of the VLSI lab will be based on: Circuit Design using SPICE, VHDL/Verilog, Design using FPGA/CPLD

LAB I - (B) ELECTIVE II LAB

ECE 803I ASIC Design Lab
Experiments on the following topics:
1. VHDL Code: Analysing & Simulation of basic digital circuits: Adder, Flip-flops, Multiplexer etc.
2. Synthesis: using FPGA/CPLD (Example: Xlinix, Altera, etc)

ECE 803II Robotics and computer vision Lab
Experiments on the following topics:
1. Robot Hardware.
2. Robot programming languages
3. Design of Robots for various Applications
4. Robot control using voice and infrared
5. Robotic trainer kit - PC based control of robotic actions

ECE 803III Biomedical Instrumentation Lab
Experiments on the following topics:
1. Biomedical transducers
2. Biomedical instruments
3. Biomedical Measurements
ECE 803IV  Parallel Computations and Architecture Lab
Experiments on the following topics:
1. Parallel Computing
2. Advanced Networking
3. Paradigms and Programmability
4. Advanced sorting algorithms

ECE 803V  Analog IC Design Lab
Experiments on the following topics:
1. Design of MOS transistor models using PSpICE
2. Design of Hardware description languages for high level design.
3. Design of CMOS Analog blocks

ECE 803VI  Digital IC Design Lab
Experiments on the following topics:
1. Designing Combinational Logic Gate in CMOS
2. Designing Sequential Logic Circuits
3. Designing Memory
4. Programmable logic devices

Course No: ECE 806

LAB II- (A) FILTER LAB
1. Design of filters using OTA (CA 3080), CC, CFA (AD844)
2. Study of Sensitivity, distortion and static power of filter.
3. Design of GIC.
4. Design of positive and negative impedance converters and inverters.
5. Design of simulated impedance blocks using OTA.
6. Design of amplifiers, integrator, differentiator etc. using OTA.

LAB II- (B) ELECTIVE III LAB

ECE 804I  Fuzzy Logic and Neural Network Lab
1. Use of fuzzy logic tool box of MATLAB.
2. Implement the basic logic gates using Single layer perceptron and show linear Separability on XY graph.
3. Design the multilayer Artificial Neural Networks for XOR gate and show that the patterns are linearly inseparable.
4. Implement the Generalized Delta Rule for training the multilayer Artificial Neural Networks.
5. Design a Hopfield network for memorizing different patterns. Test the network stabilization in case input is corrupted.
6. Design a Counter-propagation Network for Digit Recognition. Find out the Weight matrix for both Competitive and Grossberg layer.
ECE 804II  Computerized Process Control Lab
1. ON-OFF controller with and without neutral zone-level control, flow control
2. Temperature control using P, PI, PD, and PID controllers–Study of output response
4. Liquid level control using P, PI, PD, and PID controllers–Study of output response
5. Controller tuning for various processes – using Ziegler-Nichols rule
6. Controller tuning for various processes – using Cohen and Coon rule
7. Study of PLC-ladder diagram implementation for simple processes
8. PLC Simulator-Simulation of complex control systems
9. Study of feed forward, cascade, and ratio controls
10. Development of VI for temperature measurement-with display, and visual and sound alarms
11. Development of VI for level measurement-with display, and visual and sound alarms
12. Development of VI for measurement of torque/speed/displacement
13. Development of VI for audio signal spectrum analyser
14. Data Logger
15. PC based control of robotic actions
16. Implementation of digital control algorithms
17. Simulation of Artificial Neural Networks –use any software
18. Fuzzy Logic Controller–use any software
19. Simulation of Heat Exchanger Temperature Control

ECE 805III  Mechatronics Lab
1. Design and testing of the following circuits:
   i. Pressure control
   ii. Flow control
   iii. Direction control
2. Design and testing of the following circuits:
   i. Level Control
   ii. Temperature control
   iii. Cascade control
3. Design and testing of the following circuits:
   i. Stepper Motor Control
   ii. DC motor speed control
   iii. Binary distillation column control
4. Design and testing of the following circuits:
   i. Driving of circuit with programmed logic sequence, using an optional PLC in hydraulic Electro hydraulic Trainer.
   ii. Circuits with logic controls
5. Design and testing of the following circuits:
   i. Circuits with timers
   ii. Circuits with multiple cylinder sequences in Pneumatic Electro pneumatic Trainer.
6. Modeling and analysis of basic electrical, hydraulic, and pneumatic systems using MATLAB software
7. Familiarisation of programmable logic controller, development of ladder diagrams and simulation
8. Comparative study of P, PI, PD and PID controllers
10. 8051 / 8031 Programming Exercises.
13. Study of interrupt structure of 8051.
14. Interfacing high power devices to microcomputer port lines, LED, relays and LCD displays.
15. Linear actuation of hydraulic cylinder with counter and speed control.
16. Hydrometer rotation with timer and speed control.
17. Sequential operation of pneumatic cylinders.
18. Traffic light controller.
19. Speed control of DC motor using PLC.
20. Testing of Relays using PLC.

**ECE 805IV  Transducers and Recording Systems Lab**
**Experiments on the following topics:**
1. Transducers of different types
2. Thermocouple
3. Use of transducers for resistance, inductance, displacement, etc.
4. Strain measurements

**ECE 805V  Design and Analysis of Algorithms Lab**
1. Write a program to perform a Linear Search.
2. Write a program to perform a Binary Search
3. Write a program to sort elements of an array using Binary Sort.
4. Write a program to sort elements of an array using Merge Sort.
5. Write a program to sort elements of an array using Quick Sort.
6. Write a program to sort elements of an array using Bubble Sort.
7. Program for concatenation of two strings
8. Make a comparison statement & analyze it from time & space complexity point of view.
9. Write a program for the Tower of Hanoi problem using recursion
10. Write a program for the insertion of a node, searching of anode, deletion of node and traversing a tree in preorder, post order, and inorder form.
11. Write a program for creating and traversing a graph.
12. Write a program for finding the hash address using division method, mid square method and folding method
13. Write a program for 4-Queen/8-Queen problem.
14. Write a program of tic-tac-toe.
15. To search an element from an array using hashing.

**ECE 805 V  Mobile Communication Lab**
**Experiments on the following topics:**
1. FDMA, TDMA, CDMA
2. Cellular Antennas
3. Wireless cellular radio communication
Course No: ECE 807

SEMINAR

Each student shall present a seminar in the 8th semester on a topic relevant to Electronics and Communication Engineering 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. Seminar report in the prescribed form shall be submitted to the department after the approval from the committee.

Course No: ECE 808

PROJECT

This project work is the continuation of the project initiated in 6th semester. Each student group should complete the project work in this semester. Each student is expected to prepare a report and a technical paper in the prescribed format, based on the project work. The paper may be prepared as per IEEE standard and can have a maximum of eight pages. Members of the group will present the relevance, design, implementation, and results of the project before an evaluation committee consisting of the guide, and three/four faculty members of the department. The evaluation committee may also carry out continuous assessment of the project through progress seminars conducted during the semester.

Course No: ECE 809

VIVA-VOCE

Objective of the viva-voce is to examine the knowledge acquired by the student during the B.Tech. course, through oral examination. The students shall prepare for the oral examination based on the theory and laboratory subjects studied in the B.Tech. course, seminar, and project work. The examination for viva-voice shall be conducted jointly by external and internal examiners. External examiner for the viva-voice shall be appointed by the University and internal examiner shall appointed by the head of the department. Each student has to submit the certified reports seminar, and project (interim report, main report, and technical paper) before the examiners.

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