Proposed Syllabus

For

B.Tech Program

in

Electronics and Communication Engineering

By

C.S.J.M.University,Kanpur

Proposed Syllabus by C.S.J.M.University,Kanpur

Electronics & Communication Engineering

Semester – wise breakup of courses

Semester – I

		L	T	P	Credits
MTH – S101	Mathematics – I	3	1	0	4
PHY – S101T	Physics – I	3	1	0	3
PHY – S101P	Physics Lab-I	0	0	3	2
TCA – S101	Engineering Drawing	0	2	4	5
ESC – S101T	Basic Electrical & Electronics Engineering	3	1	0	3
ESC – S101P	Basic Electrical & Electronics Engineering Lab	0	0	3	2
HSS – S101	Communicative English	3	1	0	4

Semester – II

MTH – S102	Mathematics – II	3	1	0	4
PHY – S102T	Physics – II	3	1	0	3
PHY – S102P	Physics Lab-II	0	0	3	2
ISC – S101T	Programming & Computing (C & UNIX)	3	0	0	3
ISC – S101P	Programming Lab (C & UNIX)	0	0	3	2
TCA – S102T	Workshop Concepts	1	1	0	2
TCA – S102P	Workshop Practice	0	0	3	3
CHM – S101T	Chemistry – I	3	0	0	3
CHM – S101P	Chemistry Lab – I	0	0	3	2

Semester – III

MTH – S201	Mathematics – III	3	1	0	4
ESC – S202	Thermodynamics	3	1	0	4
ESC – S201	Engineering Mechanics	3	1	0	4
ECE – S201T	Analog Electronics	3	1	0	3
ECE – S201P	Analog Electronics Lab	0	0	2	2
ECE – S202	Network Analysis and Synthesis	3	1	0	4

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Semester – IV

HSS – S401	Industrial Economics	3	1	0	4
ECE – S203T	Digital Electronics	3	0	0	3
ECE – S203P	Digital Electronics Lab	0	0	3	2
ECE – S204T	Electrical Machine	3	0	0	3
ECE – S204P	Electrical Machine Lab	0	0	3	2
ECE – S205	Electromagnetic Theory	3	1	0	4
MTH – S301	Discrete Mathematics	3	1	0	4

Semester – V

ECE – S301	Electronics Circuit	3	1	0	4
ECE – S302	Signal and Systems	3	1	0	4
ECE – S303T	Measurement and Instrumentation	3	0	0	3
ECE – S303P	Measurement and Instrumentation Lab	0	0	2	1
ECE – S304T	Microprocessor	3	0	0	3
ECE – S304P	Microprocessor Lab	0	0	3	2
ECE – S305	Electrical Engineering Materials	3	1	0	4
SSM – S301	Student Seminar	0	0	3	2

Semester – VI

ECE – S306	Automatic Control System	3	1	0	4
ECE – S307T	Analog Integrated Circuit	3	0	0	3
ECE – S307P	Analog Integrated Circuit Lab	0	0	3	2
ECE – S308T	Communication System	3	0	0	3
ECE – S308P	Communication System Lab	0	0	3	2
ECE – S309	Antenna and Microwave Engineering	3	1	0	4
HSS – S301	Professional Communication	1	1	1	2
	Departmental Elective-I	3	1	0	4

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Semester – wise breakup of courses

Semester – VII

HSS – S201	Industrial Management	3	0	0	4
ECE – S401T	Digital Communication	3	0	0	3
ECE – S401P	Digital Communication Lab	0	0	3	2
ECE – S402	Data Communication	3	1	0	4
ECE – S403T	Digital Signal Processing	3	0	0	3
ECE – S403P	Digital Signal Processing Lab	0	0	3	2
SST – S401	Summer Training	0	0	3	2
PRT– S401	B.Tech. Project I	0	0	6	4

Semester – VIII

ECE – S404T	Wireless and Mobile Communication	3	0	0	3
ECE – S404P	Wireless and Mobile Communication Lab	0	0	3	2
ECE – S405T	Optical Communication	3	0	0	3
ECE – S405P	Optical Communication Lab	0	0	2	1
ECE – S406	VLSI Design and Technology	3	1	0	4
PRT – S402	B.Tech Project II	0	0	6	4
	Departmental Elective-II	3	1	0	4

Note:

1. Total No. of Lectures in each course should in the range of 40 to 45 per semester if per week three lectures are allotted.

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Electronics & Communication Engineering

Semester – wise breakup of courses

List of Departmental Elective Courses

Elective– I

ECE – S501	Power Electronics	3	1	0	4
ECE – S502	Microprocessor based Instrumentation System	3	1	0	4
ECE – S503	Multimedia Communication	3	1	0	4
ECE – S504	T.V. Engineering	3	1	0	4
ECE – S505	Artificial Intelligence	3	1	0	4
ECE – S506	Advanced Semiconductor Devices	3	1	0	4

Elective– II

ECE – S507	Information Theory and Coding	3	1	0	4
ECE – S508	Satellite Communication and Radar	3	1	0	4
ECE – S509	Digital Image Processing	3	1	0	4
ECE – S510	Artificial Neural Networks	3	1	0	4
ECE – S511	Biomedical Instruments	3	1	0	4
ECE – S512	Advanced Microprocessor	3	1	0	4
ECE – S513	Radar and Navigation	3	1	0	4

Course Code: MTH-S101 **Breakup: 3 – 1 – 0 – 4**
Course Name: Mathematics-I
Course Details:

Unit-I: Sequences & Series: Definition, Monotonic sequences, Bounded sequences, Convergent and Divergent Sequences Infinite series, Oscillating and Geometric series and their Convergence, n^{th} Term test, Integral test, Comparison Test, Limit Comparison test, Ratio test, Root test, Alternating series, Absolute and Conditional convergence, Leibnitz test.

Unit II: Differential Calculus: Limit Continuity and differentiability of functions of two variables, Euler's theorem for homogeneous equations, Tangent plane and normal. Change of variables, chain rule, Jacobians, Taylor's Theorem for two variables, Extrema of functions of two or more variables, Lagrange's method of undetermined multipliers**.**

Unit III: Integral Calculus: Review of curve tracing, Double and Triple integrals, Change of order of integration. Change of variables. Gamma and Beta functions. Dirichlet's integral. Applications of Multiple integrals such as surface area, volumes.

Unit -IV: Vector Calculus: Differentiation of vectors, gradient, divergence, curl and their physical meaning. Identities involving gradient, divergence and curl. Line and surface integrals. Green's, Gauss and Stroke's theorem and their applications.
Unit–V: Probability and Statistics: Concept of probability, random variable and distribution function: discrete and continuous, Binomial, Poisson and Normal Distributions.

Reference and Text Books:
1. G.B.Thomas and R.L.Finney : Calculus and Analytical Geometry, 9th edition, Pearson Educaion
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.

3. E. Kreyszig, Advanced Engineering Mathematics, 9th edition, John Wiley and Sons, Inc., U.K. 2011

4. R.K. Jain and S.R.K. Iyenger, Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House. 2005

5. M.D. Weir, J. Hass, F.R. Giordano, Thomas' Calculus, 11th Edition, Pearson Education.2008

Course Code: PHY-S101T **Breakup: 3 – 1 – 0 – 3**

Course Name: Physics-I

Course Details:

Unit-I: Newton's laws and their applications, Friction, conservative forces and potentials, Work energy theorem, conservation of energy and linear momentum, variable mass system (rocket), impulse, system of particles and collision, Elementary rigid body kinematics, rotation motion, moment of inertia, and Gyroscopic motion.

Unit-II: Rigid body motion, angular momentum, fundamental of classical mechanics, Lagrangian and Hamiltonian formulation.

Unit-III: Motion in non-inertial frames, fractious forces, special theory of relativity, central forces, Gravitation motion under central forces and Kepler's Laws.

Unit-IV: Simple harmonic motion (SHM), small oscillations and resonance; Wave particle duality, de-Broglie matter's waves, Phase and group velocities, Davisson-Germer experiment, Heisenberg uncertainty principle and its applications.

Unit-V: Wave function and its significance, Schrödinger equations (time dependent and independent), Schrödinger's wave equation for particle in one dimensional box, diffraction of X-rays by crystal planes, Bragg's spectrometer, Compton's effect.

Text Books and References:

1. Mechanics: D. S. Mathur
2. A textbook of Mechanics: J. C. Upadhyay
3. Concept of physics (I & II): H. C. Verma
4. Introduction to Mechanics: R. D. Kleppner and J. Kolenkow
5. Physics: Resnick, Halliday and Krane
6. Vector analysis: M. R. Spiegel
7. Classical Mechanics: Goldstien
8. Modern Physics: Author Beiser

Course Code: PHY-S101P **Breakup: 0 – 0 – 3 – 2**

Course Name: Physics Lab-I

Course Details:

1. Graphical Analysis (Ref. UIET Laboratory Manual)
2. Trajectory of projectile (Ref. UIET Laboratory Manual)

Apparatus Used (Trajectory Apparatus, Metal Balls, Channels, Vernier Callipers, Carbon & Graph Paper)

3. Moment of Inertia of Bicycle wheel (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Bicycle Wheel, Masses, Thread, Stopwatch, Meter Scale, Vernier Callipers)

4. Spring Oscillations (Ref. UIET Laboratory Manual)

Apparatus Used (Spring Oscillation Apparatus, Stop Watch, Masses)

5. Coupled Pendulum (Ref. UIET Laboratory Manual)

Apparatus Used (Coupled Pendulum Setup, Stop Watch, Scale)

6. Bifilar Suspension System (Ref. UIET Laboratory Manual)

Apparatus Used (Bifilar Suspension System Setup, Stop Watch, Masses)

7. Frequency of AC Mains by Melde's Method (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Electrical Vibrator, String, Pulley, Small Pan, Weight Box & Physical Balance)

8. Kater's(Reversible) Pendulum (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Kater's Pendulum, Stop Watch)

9. Inertia Table (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Inertia Table, Stop Watch, Vernier Callipers, Split Disc, Balancing Weights, and Given Body(Disc))

Course Code: TCA-S101 **Breakup: 0 –2 – 4 – 5**

Course Name: Engineering Drawing

Course Details:

Introduction- Drawing instruments and their uses, BIS conventions, lettering dimensioning and free hand practicing.

Orthographic projections: Lines, planes and surfaces of objects, Sectional views, Auxiliary views, Space geometry: lines and planes, True lengths and shapes, Properties of parallelism, Perpendicularity and intersections of lines and planes, Simple intersections of solids and development of lateral simple solids**.**

Isometric Projections: Introduction , isometric scale, isometric projection of simple plane figures, isometric projection of tetrahedron, hexahedron (cube), right regular prisms , pyramids, cylinders, cones, spheres, cut spheres and combinations of solids.

Introduction to computer graphics: Some problems on above topics on computer graphics.

Text Books and References:

1. Narayana,K.L. & Kannaiah,P. "Engg.Graphics". Tata McGraw Hill, New Delhi.
2. Bhatt,N.D. "Elementary Engg. Drawing" Charotar Book stall. Anand.
3. Lakshminarayanan ,V and Vaish Wannar , R. S. "Engg.Graphics".Jain Brothers , New Delhi.
4. Chandra, A.M. & Chandra Satish, "Engg.Graphics".Narosa.
5. French & Vireck, "The Fundamental Of Engg. Drawing & Graphic Tech.". McGraw Hill.
6. Gill, P.S. "A Text Book Of Machine Drawing" Katson Publishing House , Ludhiana.

Course Code: ESC-S101T **Breakup: 3 –1 – 0 – 3**

Course Name: Basic Electrical & Electronics Engineering

Course Details:

Unit – I

Sinusoidal steady state circuit analysis, voltage, current, sinusoidal & phaser presentation single phase AC circuit – behavior of resistance, inductance & capacitance & their combination, impedance concept of power, power factor. Series & parallel resonance – band width & quality factor. Three phase circuits – phase voltage & current, line & phase quantities, phasor diagram, balanced & unbalanced loads, Measurement of R, L, and C.

Unit –II

Network Theory: Network theorems – Thevenin's, Norton, maximum power transfer theorem, star delta transformation, circuit theory concept – mesh & nodal analysis.

Unit – III

Magnetic circuit concepts: self inductance , magnetic coupling analysis of single tuned & double tuned circuit involving mutual inductance , introduction to transformer.

Unit – IV

Basic Instruments, electrical measurement – measurement of voltage , current , power & energy, voltmeters & ammeter , wattmeter , energy meter , three phase power measurement , electronics instrument – multimeter, CRO(analog & digital),An overview of voltage regulator.

Unit – V

Introduction to basic electronics devices – junction diode, BJT, amplifier, op-amps & instrumentation amplifier with mathematical operation.

Number System: Introduction to binary, octal, decimal & hexadecimal systems, representation of negative numbers, 1's, 2's, 9's, 10's complement and their arithmetic.

Text Books and References:

1. W.H.Hayt & J.E. Kemmerly : Engg. Circuit Analysis , Mc Graw Hill.
2. N.N. Bhargava : 'Basic Electronics',Tata McGraw Hill.
3. Malvino, A.P. / "Electronics Principles" / Tata McGraw-Hill / 6th Ed.
4. Morris Mano, "Digital Computer Design" PHI
5 Del Toro : Principles of Electrical Engg. – PHI
6 Boylstad & Neshishkey, "Electronic devices & circuits" , PHI
7. Malvino & Leech "Digital Principle and application", TMH

Course Code: ESC-S101P **Breakup: 0 –0 – 3 – 2**

Course Name: Basic Electrical & Electronics Engineering Lab

Course Details:

1. Familiarization with the Electronic Instruments.
2. Familiarization with electronic components and Bread board.
3. To verify the Thevenin theorem.
4. To verify the Superposition theorem.
5. Measurement of voltage and frequency with CRO.
6. To study half wave rectifier.
7. To study full wave bridge rectifier.
8. To study full wave bridge rectifier with filter.
9. To study and verify the truth table of different logic gates using digital IC.
10. To study different type of transformer and there operation.
11. To study basic wiring and design a switchboard/extension board.
12. To study the polarity test of a single phase transformer.
13. To study the open & short circuit test of a transformer and calibration losses.
14. To study the load test and efficiency of a single phase transformer.

Course Code: HSS-S101 **Breakup: 3 –1 – 0 – 4**

Course Name: Communicative English

Course Details:

Unit 1: Basics of Technical Communication: Technical Communication: features; Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group); Barriers to Communication.

Unit 2: Constituents of Technical Written Communication: Word formation, Prefix and Suffix; Synonyms and Antonyms; Homophones; One Word Substitution; Technical Terms; Paragraph Development: Techniques and Methods -Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation- various steps.

Unit 3: Forms of Technical Communication: Business Letters: Sales and Credit letters; Letter of Enquiry; Letter of Quotation, Order, Claim and Adjustment Letters; Memos, Notices, Circulars; Job application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance.

Unit 4: Presentation Strategies: Defining Purpose; Audience & Locale; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Space; Setting Nuances of Voice Dynamics; Time- Dimension.

Unit 5: Value- Based Text Readings: Following essays form the suggested text book with emphasis on Mechanics of writing,

(i) The Language of Literature and Science by A.Huxley
(ii) Man and Nature by J.Bronowski
(iii) The Mother of the Sciences by A.J.Bahm
(iv) Humanistic and Scientific Approaches to Human Activity by Moody E. Prior
(v) The Effect of Scientific Temper on Man by Bertrand Russell.

Text Books and References:

1. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, New Delhi.
2. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press 2007, New Delhi.
3. Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.
5. How to Build Better Vocabulary by M.Rosen Blum, Bloomsbury Pub. London.
6. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.
7. Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan India Ltd. Delhi.
8. Manual of Practical Communication by L.U.B. Pandey & R.P. Singh; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, Delhi.

MTH-S102 **Breakup: 3 – 1 – 0 – 4**

Course Name: Mathematics-II
Course Details:

Unit–I: Matrix Algebra: Elementary operations and their use in finding Rank, Inverse of a matrix and solution of system of linear equations. Orthogonal, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, Normal & Unitary matrices and their elementary properties.

UNIT-II: Vector Space, Linear transformation, Linear dependent and linear independent,Eigen-values and Eigenvectors of a matrix, Cayley-Hamilton theorem, Diagonalization of a matrix.

Unit-II: Ordinary Differential Equations of First Order: Solution of first order differential equation, separation of variable, homogeneous equation, exact differential equation, linear differential equation, Bernoulli equation.

Unit-III: Ordinary Differential Equations of Second Order: Solution of linear differential equationsWith Constant coefficients. Euler-Cauchy equations, Solution of second orderDifferential equations by changing dependent and independent variables.Method of variation of parameters, Introduction to series solution method, Frobenious Methods.

Unit-III: Laplace Transform: Laplace and inverse Laplace transform of somestandard functions, Shifting theorems, Laplace transform of derivatives andintegrals. Convolution theorem, Initial and final value theorem. Laplacetransform of periodic functions, error functions, Heaviside unit step functionand Dirac delta function. Applications of Laplace transform.

Text Books and Reference:
1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
3. C. Ray Wylie & Louis C. Barrett, Advanced Engineering Mathematics, Tata McGraw-Hill Publishing
Company Ltd. 2003.
4. G.F. Simmons, Differential Equations, Tata McGraw-Hill Publishing Company Ltd. 1981.

Course Code: PHY-S102T **Breakup: 3 – 1 – 0 – 3**

Course Name: Physics-II

Course Details:

Unit-I: Vector analysis: scalars, vectors, vector differentiation, gradient, divergence and curl, vector, integration, Gauss divergence and Stoke's theorem, co-ordinate systems (spherical polar & cylindrical), Electrostatics: electric fields, potentials, Gauss's law, electric dipoles and multipoles, polarization, bound charges, linear dielectrics and force on dielectrics, electric displacement, boundary condition of E and D, work and energy of electrostatics, Laplace's equation and uniqueness theorem, image theory.

Unit-II: Motion of charge in electric and magnetic field, Magnetostatics: current density, magnetic fields, Ampére's law, Faraday's law, magnetic potential, magnetic polarization, bound current, magnetic properties of materials (para, dia and ferro), boundary condition of B and H, basic idea of superconductor.

Unit-III: Displacement current, Maxwell's equations for free space and matter (dielectric and conductor), Electromagnetic waves, Poynting vector.

Unit-IV: Origin the refractive index, Interference: division of wave-front and division of amplitude; diffraction: Fraunhoffer, Grating, Resolving power (grating, prism, telescope and microscope); polarization: Phenomena of double refraction, Nicol prism, optical activity Production and analysis of plane, circular and elliptical polarized light, Frenels theory of optical activities and Polarimeters.

Unit-V: Fiber optics and photonics: Fundamental ideas about optical fiber, types of fibers, Total Internal Reflection (TIR), critical angle, acceptance angle and application, basic principal of Laser and Holography and fundamental ideas about photonics.

Text Books and References

1. Optics: Ajoy Ghatak
2. A textbook of OPTICS: Subrahmanyam, Brijlal and Avadhanulu
3. Electrodynamics: David J. Griffith
4. Classical electrodynamics: J. D. Jackson
5. Modern Physics: Author Beiser
6. Photonic Crystals: J. D. Joannopoulos, R. D. Meade, and R. D. Winn

Course Code: PHY-S102P **Breakup: 0 – 0 – 3 – 2**

Course Name: Physics Lab-II

Course Details:

1. Newton's Ring (Ref. Book by K. K. Dey, B. N. Dutta)
Apparatus Used (Traveling Microscope, Support for Glass Plate inclined at 45^0 to the Vertical, Short Focus Convex Lens, Sodium Lamp, Plano Convex Lens, An Optically Plane Glass Plate)
2. Prism Spectrometer (Ref. Book by K. K. Dey, B. N. Dutta)
Apparatus Used (Spectrometer, Glass Prism, Reading Lens, Mercury Lamp)
3. Plane Transmission Grating (Ref. Book by K. K. Dey, B. N. Dutta)
Apparatus Used (Spectrometer, Diffraction Grating, Mercury Lamp)
4. Ballistic Galvanometer (Ref. Book by K. K. Dey, B. N. Dutta)
Apparatus Used (Ballistic Galvanometer, Morse key, Damping key, Condenser, Rheostat, Volt Meter, Storage Battery, Connection Wires)
5. Carey Foster's Bridge (Ref. Book by K. K. Dey, B. N. Dutta)
Apparatus Used (Carey Foster's Bridge, Laclanche cell, Resistance Box, Galvanometer, Plug Key, Copper Strip)
6. Fresnel's Biprism (Ref. Book by K. K. Dey, B. N. Dutta)
Apparatus Used (Sodium Lamp, Biprism, Convex Lens, Optical Bench with Four Uprights)
7. Variation of Magnetic Field (Ref. Book by K. K. Dey, B. N. Dutta)
Apparatus Used (Stewart and Gee type Tangent Galvanometer, Storage Battery, Commutator, Ammeter, Rheostat, One way Plug Key, Connection Wires)
8. Polarimeter (Ref. Book by K. K. Dey, B. N. Dutta)
Apparatus Used (Sodium Lamp, Polarimeter, Physical Balance)

Course Code: ISC – S101T **Breakup: 3 – 0 – 0 – 3**

Course Name: Programming & Computing(C & UNIX)

Course Details:

Basic concepts of Computers, Basic UNIX Concepts and Vi - Editor

Introduction to C: Basic Programming concepts, Program structure in C, Variables and Constants, Data types, Conditional statements, control statements, Functions, Arrays, Structures, Introduction to pointers, Introduction to File Systems.

Text Books and References:

1. Programming in C, Schaum Series
2. The 'C' Programming, Denis Ritchi (PHI)
3. Programming in C, Venugopal (TMH)
4. Let us C, Yashant Kanetkar (BPB)
5. Programming in C, Balaguruswami (TMH)

Course Code: **ISC – S101P** **Breakup:** **0 – 0 – 3 – 2**

Course Name: **Computer Programming Lab:**

Course Details:

Learning OS Commands

Practice of all Internal and External DOS Commands, Writing simple batch programs, Exposure to Windows environment, Practice of UNIX commands and Vi editor, Writing simple shell script

C Programming:

Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input Output Formatting, Control structures, arrays, functions, structures, pointers and basic file handling.

Course Code: **TCA – S102T** **Breakup:** **1 – 1 – 0 – 2**

Course Name: **Workshop Concepts**

Course Details:

Historical perspectives; Classification of Manufacturing process.

Machining: Basic principles of lathe machine & operations performed on it. Basic description of machines & operations of shaper-planer, drilling, milling, grinding.Unconventional machining processes , Machine tools.

Casting processes:pattern & allowances. Moulding sands & its desirable properties. Mould making with the use of a core. Gating system. Casting defects & remedies. Cupola furnace. Die-casting & its uses.

Metal forming: Basic metal forming operations & uses of such as-forging, rolling, wire& tube drawing/making & extrusion, & its products/applications, press work & die & punch assembly, cutting & forming, its application. Hot working vs Cold working. Powder metallurgy: powder metallurgy process & its applications, plastic-products manufacturing, galvanizing & electroplating.

Welding: Importance & basics concepts of welding, classification of welding processes. Gas welding, types of flames, Electric arc welding. Resistance welding. Soldering & brazing and its uses. Modern trends in manufacturing, Automation. Introduction to NC/CNC/DNC,FMS,CAD/CAM,CIM and factory of future.

Text Books and References:

1. Chapman,W A J & Arnold ,E "Workshop Technology ; vol. I,II&III" Viva Low Priced Student Edition.
2. Raghuwanshi,B S "Workshop Technology ; vol. I&II" Dhanpat Rai & Sons
3. Chaudhary, Hajra "Elements of Workshop Technology ; vol. I&II" Media Promoters & Publishers.

Course code: **TCA – S102P** **Breakup:** **0 – 0 – 3 – 3**

Course Name: **Workshop Practice**

Course Details:

1. Foundry (1 turn)
2. Welding (3 turns)
   a. Gas Welding (1 turn)
   b. Arc Welding (2 turns)
      (i). Lap Joint (1 turn)
      (ii) Butt Joint (1 turn)
3. M/C Shop (4 Turns)
4. Fitting & Sheet Metal Work (1 turn+1 turn)
5. Carpentry Shop(1 turn)
6. Black-smithy shop(1 turn)

Text Books and References:

1. Chapman,W A J & Arnold ,E "Workshop Technology ; vol. I,II&III" Viva Low Priced Student Edition.
2. Raghuwanshi,B S "Workshop Technology ; vol. I&II" Dhanpat Rai & Sons .
3. Chaudhary, Hajra "Elements of Workshop Technology ; vol. I&II" Media Promoters & Publishers.

Course Code: **CHM – S101T** **Breakup:** **3 – 0 – 0 – 3**

Course Name: **Chemistry - I**

Course Details:

UNIT-I - Atoms and Molecules:

1. Need for wave mechanical picture of atomic structure [Photoelectric effect, de Broglie concept of matter waves], Derivation of schrodinger wave equation [as an example particle moving in unidimensional potential well]
2. Chemical Bonding- Orbital concepts in bonding, V.B. and M.O. theory, M.O. diagrams, Intermolecular interactions.

UNIT-II - Reaction Dynamics:

Order, Molecularity, Rate law, Integrated rate equations, Methods of determining of order of reaction, Complex reaction kinetics- chain reactions and reversible reactions in detail, Catalysis and enzyme catalysis

UNIT-III - Electrochemistry:

Arrhenius theory of electrolytic dissociation, Transport number, Kohlrausch's law, Solubility product, Redox reaction, Electrochemical and concentration cells.

UNIT-IV- Stereochemistry:

Introduction, Chirality, Enantiomers, Diastereomers, Projection formula of a tetrahedral carbon, Geometrical isomerism, Conformers

UNIT- V- Spectroscopic Techniques:

General introduction to IR, NMR and Mass spectroscopy

UNIT-VI - Organic Reactions:

Introduction, Electron displacement effects, Organic intermediates, Types of reactions [addition, elimination and substitution reactions]

UNIT-VII - Photochemistry:

Photoexcitation of organic molecules, Jablonski diagram, Laws of photochemistry and quantum yield, Some examples of photochemical reactions, Chemistry of vision and other applications of photochemistry.

UNIT-VIII - Transition Metal Chemistry:

Stucture of coordination compounds corresponding to coordination number up to 6, Tpes of ligands, Isomerism [geometrical, optical, ionization, linkage and coordination], Theories of bonding in coordination compounds- crystal field theory, Valence bond theory, Chelation.

UNIT-IX - Laboratory Practical Classes:

Text Books and References:

Physical Chemistry- 1. P.W. Atkins
2. Puri & Sharma

Organic Chemistry- 1. Morisson & Boyd
2. Bahl and Bahl

Inorganic Chemistry- 1. J.D. Lee
2. R.P. Rastogi

Engineering Chemistry- Shashi Chawla

Course Code: **CHM – S101P** **Breakup:** **0 – 0 – 3 – 2**

Course Name: **Chemistry Lab- I**

Course Details:

Exp. 01. To estimate the strength of the given unknown solution of Mohr's salt (Ferrous ammonium sulphate ($FeSO_4(NH_4)_2SO_4.6H_2O$) using $KMnO_4$ solution as an intermediate.

Exp. 02. To prepare a sample of p-nitroacetanilide.

Exp. 03. To prepare a sample of Aspirin.

Exp. 04. Preparation of Tris (Thiourea) Copper (I) sulphate.

Exp. 05. Preparation of Hexamine Nickel (II) chloride $[Ni(NH_3)_6]Cl_2$.

Exp. 06. Estimation of commercial caustic soda: Determination of the amounts of sodium carbonate and sodium hydroxide present together in the given commercial caustic soda.

Exp. 07. Estimation of calcium ions present in tap water.

Exp. 08. To determine the partition coefficient of acetic acid between n-butanol and water.

Exp. 09. To study the photochemical reduction of a ferric salt (Blue printing).

Exp. 10. To determine the viscosity of a given liquid (30% sugar solution) at room temperature using Ostwald's viscometer.

Exp. 11. To separate Ag(I), Hg (I) and Pb (II) ions by paper chromatography and calculate their RF values.

Exp. 12. Understanding reaction kinetics and calculating the rate and order of a reaction.

Exp.13. To study the kinetics of methyl acetate hydrolysis catalyzed by 0.5N HCl solution.

Course Code: MTH-S201 **Breakup: 3 – 1 – 0 – 4**

Course Name: Mathematics - III

Course Details:

Unit – I : Function of a Complex variable: Complex numbers- power and roots, limits, continuity and derivative of functions of complex variable, Analytic functions, Cauchy-Reimann equations, Harmonic function, Harmonic conjugate of analytic function and methods of finding it, Complex Exponential, Trigonometric, Hyperbolic and Logarithm function.

Unit – II : Complex Integration: Line integral in complex plane(definite and indefinite), Cauchy's Integral theorem, Cauchy's Integral formula, Derivatives of analytic functions, Cauchy's Inequality, Liouville's theorem, Morera's theorem, Power series representation of analytic function and radius of convergence, Taylor's and Laurent's series, singularities, Residue theorem, Evaluation of real integrals, Improper Integrals of rational functions.

Unit-III: Fourier series: Trigonometric Fourier series and its convergence. Fourierseries of even and odd functions. Fourier half-range series. Parseval`sidentity. Complex form of Fourier series.

Unit-IV: Fourier Transforms: Fourier integrals, Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms and their elementaryproperties. Convolution theorem. Application of Fourier transforms to BVP.Laplace

Unit-V: Partial Differential Equations: Formation of first and second order partialdifferential equations. Solution of first order partial differential equations:Lagrange`s equation, Four standard forms of non-linear first order equations.

Text Books and Reference :

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.

Course Code: ESC-S202 **Breakup: 3 – 1 – 0 – 4**

Course Name: Thermodynamics

Course Details:

Fundamental concepts: System, Property, Work and Heat interactions.

Zeroth law: Zeroth law of thermodynamics, Temperatutre & its measurement & scales.

First law: Thermodynamic processes, calculation of work in various processes, non flow work & flow work. Joule's experiment, First law of thermodynamics applied to open systems, study flow system and their analysis. Applications to closed systems and flow processes. Analysis of unsteady processes. Limitations of first law of thermodynamics, PMM1.Thermodynamics properties of fluids.

Second law: Devices coverting heat to work, Thermal reservoir, heat engines efficiency, Devices converting work to heat, heat pump, refrigerator, COP, Reversed heat engine, Kelvin planck statements, Clausius statement,reversible & irreversible processes, Carnot cycle ,PMM2, Entropy , Availability , equilibrium Criterion , Maxwell Relations Thermodynamics relations , Clapeyron equation , Gibb's Phase rule.

Properties of steam & thermodynamic cycles: pure substance, properties of steam, Phase Diagram, Power & Refrigeration cycles ,Psychrometry. Adiabatic flame temperature , Equilibrium conversion, Statistical definition of entropy Kinetic theory of Ideal Gases.

Text Books and Reference:

1. Y. A. Cengel and M. A. Boles, Thermodynamics-An Engineering Approach, McGraw Hill
2. Y.V.C. Rao, Introduction to Thermodynamics, Universities Press
3. P.K. Nag "Engineering Thermodynamics". Tata McGraw Hill.
4. D.B. Spalding & E.H. Cole " Engg. Thermodynamics" . Edward Arnold.
5. G.A Hawkins,. . " Engg. Thermodynamics" John Wiley & Sons.
6. G.H. Van Wylen, & R.E. Sonntag, "Fundamentals of Classical Thermodynamics". John Wiley & Sons.
7. J.P. Hollman , " Thermodynamics". McGraw Hill

Course Code: ESC-S201 **Breakup: 3 – 1 – 0 – 4**

Course Name: Engineering Mechanics

Course Details:

General Coplanar force systems : Basis concepts, Law of motions, principle of transmissibility of forces, Transfer of a force to parallel position, Resultant of a force system, simplest resultant of two dimensional concurrent & non concurrent force systems, free body diagrams, equilibrium & its equations, applications.

Trusses & Cables : Introductions, simple truss & solutions of simple truss, method of joints & method of sections.

Friction : Introductin , Laws of coulomb friction, equilibrium of bodies involving dry friction, belt friction, applications.

Centre of gravity , centroid, Moment of Inertia : Centroid of plane, curve, area ,volume & composite bodies, moment of inertia of plane area, parallel axis theorem, perpendicular axis theorem, principal moment inertia, mass moment of inertia of circular ring, disc, cylinder, sphere and cone about their axis of symmetry.

Beams: Introductions, shear force and bending moment , differential equations for equilibrium, shear force & bending moments diagrams for statically determinate beams.
Kinematics of rigid body: Introduction, plane motion of rigid bodies, velocity & acceleration under translation & rotational motion, Relative velocity, projectile motion.

Kinetics of rigid bodies: Introduction, force, mass & acceleration, work & energy, impulse & momentum, D'Alembert principles & dynamic equilibrium. Virtual work.

Text Books and Reference :

1. Beer F.P. & Johnston ,F.R. " Mechanics For Engineers", McGraw Hill.
2. Shames, I.H. " Engg. Mechanics" , P H I.
3. Meriam , J. L. " Statics" , J. Wiley.
4. Meriam , J. L. " Dynamics" , J. Wiley.

Course Code: ECE – S201T **Breakup: 3 1 0 3**

Course Name: Analog Electronics

Course Details:

Unit-I

Energy bands in solid, Concept of forbidden gap, Insulator, Metals and Semiconductor. Transport phenomenon in semiconductors: - mobility and conductivity, intrinsic semiconductor, donor and acceptor impurities, Fermi level, Drift currents and Diffusion currents.

Unit-II

Junction diode: PN junction, Depletion layer, characteristics, Piece-wise linear characteristics & equivalent circuits, Diode resistance, Capacitance, switching time.
Diode Applications: Half wave and Full wave Rectifier, bridge Rectifier, Capacitor Filter, Diode clipping, Clamping and voltage multiplying circuits.
Special diode Types: Zener diode, Schottky barrier diode, Varactor diode, Photodiode, Light emitting diode.

Unit-III

Bipolar Junction Transistor: BJT, Physical structure, Transistor current, CE, CB & CC configuration, CE Configuration characteristics curves (Cutoff, Active & saturation regions), requirement of biasing, Self biasing in CE configuration, Bias stability.
Transistor as amplifier: Small signal equivalent circuit, The Hybrid-pi model, The T-model, Augmenting these models for the Early effect, Graphical analysis of CE amplifier, Voltage gain, current gain and input-output impedance calculation, Approximate equivalent circuit in CE, CB and CC configurations. A general large signal model for BJT- The Ebers-Moll Model.

Unit-IV

Field effect transistor: Structure and physical operation of Enhancement type MOSFET. The Depletion Type MOSFET, MOSFET circuits at DC, The MOSFET as an Amplifier. Biasing in MOS Amplifier circuits, Basic configuration of single stage IC MOS amplifier. C-S Amplifier, C-G Amplifier, C-D Amplifier (source follower) configurations.

Unit-V

The Junction Field Effect Transistor, Gallium Arsenide Devices, The MESFET Device Structure, Operation, Characteristics and Models.

Textbooks:

1.Boylstad & Neshishkey, "Electronic devices & circuits" , PHI
2.Milliman, J. Halkias, "integrated elctronics", TMH

References:

1. Streetman, B.G. & Banerjee, Sanjay / "Solid State Electronic Devices" / Prentice Hall (India) / 5th Ed / Pearson Education.
2. Adel S. Sedra /Kenneth C. Smith/ "Microelectronics Circuits"/Oxford University Press,5th Edition,2009
3. Bell, David A. / "Electronic Devices & Circuits"/ Prentice-Hall (India), 4th Ed.
4. Millman, J. and Grabel, A. / "Microelectronics"/ McGraw –Hill.
5. Nair, B. Somanathan /"Electronic Devices & Applications"/ Prentice-Hall (India)
6. Nagrath , I.J. / "Electronics, Analog & Digital"/ Prentice-Hall (India).
7. Neamen, Donald A. / "Electronic circuit Analysis & design" / Tata McGraw Hill
8. Neamen, Donald A. / "Semiconductor physics & Devices" / Tata McGraw Hill
9. Salivahanan, S. & Kumar, Suresh N. & Vallavraj / "Electronic Devices & Circuits" / Tata McGraw-Hill.
10. Schaum's Outlines / "Electronic Devices & Circuits"/ Tata McGraw Hill, 2nd Ed.

Course Code: ECE – S201P **Breakup: 0 0 2 2**

Course Name: Analog Electronics Lab

Course Details:

List of Experiments:

1) To measure DC/AC voltage and frequency using CRO and FG.
2) To obtain the static characteristics of a PN junction diode and then obtain the forward resistance of the diode at a given operating point.
3) To obtain V-I characteristics of a Zener diode and note down its breakdown potential.
4) Fabrication and testing of a half wave rectifier and observe the smoothig of the output using capacitor filter and ripple suppression using a zener diode.
5) To bias a given transistor in active region in CE configuration.
6) Measurement of current gain A_i ,Input impedance R_i,and output impedance R_o,for an RC coupled CE amplifierin mid frequency range(e.g. 1 KHz).
7) CE amplifier and make the
   (i) Upper cut off.
   (ii) Lower cutoff frequencies and hence estimate the BW.
8) Bias a MOS transistor in saturation region in C-S configuration.
9) Bias a JFET in saturation region and operates it as an RC coupled amplifier in C-S configuration and measure the voltage gain.

Course Code: ECE – S202 Breakup: 3 1 0 4

Course Name: Network Analysis and Synthesis

Course Details:

Unit-I

Introduction to graph theory: Definitions- graph, tree, spanning tree, loop, co-tree, cut set, tie set, loop and nodal analysis, introduction to continuous time signal, unit step, ramp, and impulse.

Unit-II

Network Transient and steady state analysis, Transient response of simple RL,RC, series and parallel circuits, Transient response of RLC series and parallel circuits for sinusoidal and step input excitation using Laplace transform method. Differential equation formation of linear time invariant continuous systems, block diagram representation of LTI continuous networks and systems, time domain analysis of LTI network using laplace transform. Relation between impulse response and system functions, concepts of transform impedance and synthesis.

Unit-III

Network Functions Concept of Complex Frequency, Transform Impedances, Network function of one port and two port networks, Concept of poles and zeros, Relation between locations of poles. Time response and stability. Frequency response and bode plots. Interrelation between frequency response and convolution integral.

Unit-IV

Two port networks, Two port parameters, Inter-conversion of 2 port parameter, network function- Driving point and transfer function, Inter-connections of 2 port networks, reciprocity ladder networks, Image impedance, Characteristic impedance, T-∏ transformation and analysis.

Unit-V

Positive real functions and properties, synthesis of LC, RL and RC using Cauer and Fosters first and second form.

Text books:

1. M.E. Valkenburg: Network Analysis
2. D.R. Choudhary: Network Analysis.

References:

3. Narsingh Deo : Graph theory
4. A.Chakrabarti,"Circuit Theory" Dhanpat Rai & Co.
5. W.H. Hayt & Jack E-Kemmerly, Engineering Circuit analysis" Tata McGrawHill.
6. Soni, Gupta ,"Circuit Analysis", Dhanpat Rai & Sons.
7. Ram Kalyan, Linear Circuits Oxford University Press.

Course Code: **HSS-S401** **Breakup:** **3 – 1 – 0 – 4**

Course Name: **Industrial Economics**

Course Details:

Unit -I
Definition and scope of engineering economics
Concept of supply and demand
Price elasticity and cross elasticity of demand
Production
Engineering costs and cost estimation
Concept of time value of money
Cash flow analysis

Unit-II
Perfect competition
Monopoly
Monopolistic competition

Unit-III
National Income, GDP
Inflation, Deflation and treatment

Unit-IV
Functions of RBI
Indian Tax System

Text Books and References:

1. Henderson, M. James and Quandt, E. Richards, "Microeconomic Theory: A Mathematical Approach".
2. Koutsoyiannis, A., "Modern micro economics".ardwick, Philip., Khan Bahadure., Langmeed, John, "An Introduction to modern economics".
3. Samuelson, A. Paul, "Economics".
4. Shapiro, Edward. "Macro economics".
5. Newnan, G. Donald, Eschenbach, G.Ted, Lavelle, P. Jerome, "Engineering Economic Analysis".

Course Code: ECE – S203T Breakup: 3 0 0 3

Course Name: Digital Electronics

Course Details:

Unit – I

Combinational circuits: Boolean algebra – Boolean theorems, minimization of Boolean function, K-Map, minimization using tabular method, Basic logic gates. Boolean functions realization using logic gates, half & full adder, subtractors, coders, decoders, multiplexer, & de-multiplexers & their applications, Comparators, Digital techniques related to PLAs, PALs, ROMs

Unit – II

Sequential circuits : introduction to sequential logic , concept of history sensitive circuits & feed back , introduction to flip-flop , RS, D, T, JK flip-flops, race around condition, Master slaves , flip-flop clocked sequential circuits.

Unit – III

Counter and shift register : Asynchronous & Synchronous counters , design of synchronous circuits, state transition diagram , excitation table for flip – flop , design using minimization techniques , shift register , basic principal , serial and parallel data transfer , shift left/right register.

Unit – IV

Logic families, diode switching, transistor as a switching element, circuit concept and comparison of logic families – TTL, ECL, NMOS & CMOS. Tristate logic open collector outputs, interfacing between logic families.

Unit – V

Digital Techniques related to PLDs, FPGA, GaAs defined circuits, Introduction to BiCMOS circuits.

Textbooks:

1. Morris Mano, "Digital Design" PHI
2. "Digital Electronics", Bignill & Donovan.
3. "Digital Integrated Circuit" A.K.Gautam-Katson Publication.

References:

1. Taub and Schilling "Digital Integrated Electronics",TMH
2. Bartee , Thomas C. / "Fundamentals of Digital Computers"/ Tata McGraw-Hill
3. Gopalan, K. "Gopal" / "Introduction To Digital Microelectronic Circuits" / Tata McGraw-Hill
4. Millman, Jocob & Taub, Herbert / "Pulse, Digital & Switching Waveforms" / Tata McGraw-Hill
5. Malvino, A.P. & Leach, Donald P. / "Digital Principles & Applications" / Tata McGraw-Hill
6. Tokheim, H. Roger L. /"Digital Electronics Principles & Application"/ Tata McGraw-Hill / 6th Ed.

Course Code: ECE – S203P **Breakup: 0 0 3 2**

Course Name: Digital Electronics Lab

Course Details:

List of Experiments:

To study the operation of transistor

(a) As a normal open switch(inverter).

(b) As a normally closed switch.

2. To realize two input AND ,OR,NAND,NOR gate using diodes and transistor inverter and verify truth table.

3. To verify NAND gate operation on IC-7400,NOR gate operation on 7402 and realize AND,OR,EX-OR,NOR gates using NAND gates.

4) (a)To realize the circuit of half Adder and Full adder and verify the truth table using 7400 NAND gates only.

(b)Verify the operation of 7483four bit adder.

5) To verify the truth table of 4 X 1 multiplexer using IC-74153.

6. (a) To realise 2 to 4 line decoder with and without enables and veify their truth tables.

(b) To realize a 4 X 2 encoder and verify its truth table.

7. To realize a 3 variable Boolean function using multiplexer IC 74153.

8. To study the various types of Flip-Flops

(a) RS Latch

(b) Clocked RS Flip-Flop

(c) D Flip-Flop

(d) Verify the operation of JK flipflop using IC 7476

9. To verify the operation of 7490 decade counter as

a) MOD 2 Counter.

b) MOD 5 Counter

c) MOD 10 counter.

Display the count on a seven-segment display.

10. To realize and verify the operation of 4 bit shift input resister-using IC 7474

Course Code: ECE – S204T **Breakup: 3 0 0 3**

Course Name: Electrical Machine

Course Details:

Unit – I

D.C. Machines : Constructional features and principles of operation of shunt, series and compound generators and motors including EMF equation and armature reaction, performance characteristics of generators and motors, starting speed control and breaking of motors.

Unit – II

Two quadrant and four quadrant operation of motors choice of de motors for different application. Losses and efficiency. Transformers : construction EMF equation , principle of operation . phasor diagram on no – load . Effect of load equailent circuit , voltage regulation . losses and efficiency .

Unit – III

Tests on transformers. Prediction of efficiency and regulation , autotransformers , Instrument transformers, three phase transformers. Induction motors : rotating magnetic fields . principles of operation .

Unit – IV

Equivalent circuit, torque – slip characteristic. Starters for cage and wound rotor type induction motors, speed control and breaking, single phase induction motors and methods of starting.

Unit – V

Synchronous machines : Construction, EMF equation. Effect of pitch and distribution, armature reaction and determination of regulation of synchronous generators . principle of motor operation, effect of excitation on line currents (V – curves). Methods of synchronization. Typical applications of AC motor in industries.

Textbooks:

1. Hughes Edward, Electrical Technology, Addison Wesle longinan ltd.
2. Nagrath I.J.& Kothari D.P.Electrical Machines. TMH

References:

3. Cotton H., Advanced Electrical Teclitiolog , Wheeler & Co.
4. Fitzerald, Kingsicy, Kusko – Dunias – Electrical Machines. TMLA.
5. Kosow L.L, Electrical Machines and Transformers. PHI

Course Code: **ECE – S204P** **Breakup:** **0 0 3 2**

Course Name: **Electrical Machine Lab**

Course Details:

List of Experiments:

1) Study of different type of transforme and specification.
2) To wind 5-0-5 or 12-0-12 single phase transformer.
3) Determination of circuit parameters and loss in single phase transformer by OC test.
4) Determination of circuit parameters in single phase transformer by SC test.
5) Measurement o f efficiency of transformer.
6) Calculation of voltage regulation of single phase transformer,
7) Speed control of dc shunt motor by field control method.
8) Speed control of dc shunt motor by armature control method.
9) To study the construction and principle of operating of single phase induction type energy meter
10) To find the calibration error of single phase induction type energy meter.
11) To study the three phase induction motor and determination of efficiency.

To study synchronous meter.

Course Code: ECE – S205 **Breakup:** 3 1 0 4

Course Name: Electromagnetic Theory

Course Details:

Unit-I

ELECTROSTATICS AND MAGNETOSTATICS

Review of vector calculus, Coulomb's law, Electric displacement and Displacement density, Lines of Force and Lines of Flux. Gauss's law, The potential function, Field of infinitesimal Electric dipole, Field due to continuous distribution of charges, equipotential surfaces, Divergence Theorem, Poisson's Equation and Laplace's equation, Solution by means of Electrical images, Capacitance, Capacitance of parallel plate and coaxial cables, Energy in Electrostatic fields, Boundary conditions.

Steady Magnetic Field: Magnetic field strength H, Magnetic flux density B, MMF, Ampere's circuital law, Ampere's work law in differential vector form, Permeability, Energy stored in a Magnetic field, Ampere's law for a current element(Biot-Savart Law), Magnetic vector potential, Boundary conditions, Analogies between Electric and Magnetic fields.

Unit-II

TIME VARYING FIELDS AND MAXWELL'S EQUATION

The Equation of continuity for Time-Varying Fields, Maxwell's Equations, Representation in Differential form, Integral form and word statement, Boundary conditions, Faraday's law of electromagnetic induction, Transformer and motional emf, Time harmonic field, Electromagnetic potential, Relation between circuit theory and field theory.

Unit-III

UNIFORM PLANE WAVE

Wave equation: solution for Dielectric and Conducting media, free space propagation, Surface impedance, Depth of penetration (skin depth), phase velocity, and group Velocity, Polarization of uniform plane waves, Reflection by a Perfect conductor, normal and oblique incidence, Reflection by a perfect Dielectric-Normal and Oblique Incidence, Brewster Angle, Surface Impedence.

Poynting Vector and Flow of Power: Poynting theorem, Instantaneous average and Complex Poynting Vector, Power Loss in a Plane Conductor.

Unit-IV

TRANSMISSION LINE AND GUIDED WAVES

Distributed parameters Model of Transmission Line, open wire and coaxial cable, Transmission line theory: line equation, lossless line, Voltage standing wave ratio (VSWR), Transmission line as circuit element, Quarter wave transformer, Impedance matching, single stub, Solution of Transmission Line problems using Smith chart.

Wave between parallel planes, TE waves, TM waves, characteristics of TE and TM waves, TEM waves and its properties, Attenuation in parallel plane guides, wave impedance.

Unit-V

INTRODUCTION TO RADIATION

Vector potential **Radiation from small current element:** Near Field and Far Field, Radiation Pattern, Power Radiated, Radiation Resistance.

Text Books References:

1. Engineering Electromagnetic- Hayt (sixth edition)
2. Electromagnetic- Wave and radiating system-Jorden & Balmein
3. Electromagnetic- J.F.D. Kraus; Antenna-J.F.D. Kraus
4. Electromagnetic- Kraus & Keith; Antenna, and wave Propagation – K.D.Prasad
5. Harington, R. F. / "Time Harmonic EM Fields" / McGraw Hills
6. Collin, R. E. / "Antennas and Radio Wave Propagation"/ Tata McGraw-Hill
7. Pramanik, Ashutosh / "Electromagnetism, Theory & Applications" / Prentice Hall (India).
8. Schaum's Outlines / "Electromagnetics" / Tata McGraw-Hill / 2nd Ed..
9. Kraus, Fleisch / "Electromagnetics with Applications" / Tata McGraw-Hill, 5th Ed.
10. Sadiku , Matthew N.O. / "Elements of Electromagnetics" / Oxford University Press, 3rd Ed.

Code: MTH-S301 **Breakup: 3 – 1 – 0 – 4**

Course Name: Discrete Mathematics

Course Details:

Unit-I: Introduction to formal logic, Formulae of prepositional logic, Truth tables, Tautology, Satisfiability, Contradiction, Normal and principle normal forms, Completeness. Theory of inference. Predicate calculus: Quantifiers, Inference Theory of predicate logic, Validity, Consistency and Completeness.

Unit-II: Sets, Operations on sets, Ordered pairs, Recursive definitions, Relations and Functions, Equivalence relations, Composition of relations, Closures, Partially ordered sets, Hasse Diagram's, Lattices (Definition and some properties).

Unit-III: Algebraic Structures : Definition, Groupoid, Monoid, Semi groups, Groups, Subgroups, Abelian groups, Cyclic groups.

Unit-IV: Graph Theory: Incidence, Degrees, Walks, Paths, Circuits, Charactarization theorems, Connectedness, Euler graphs, Hamiltonian graphs, Travelling salesman problem, Shortest distance algorithm (Djkstra's), Trees, Binary trees, Spanning trees, Spanning tree algorithms Kruksal's and Prim's.

Unit-V: Introduction to Combinatorics: Counting techniques, pigeon–hole principle, Mathematical induction, Strong induction , Permutations and Combination.Generating functions, Recurrence relations and their solutions.

Text Books and Reference :

1. C.L.Liu : Discrete Mathematics
2. B.Kolman, R.C.Busby, and S.C.Ross, Discrete mathematical structures, 5/e, Prentice Hall, 2004
3. J.L.Mott, A.Kandel and T.P.Baker : Discrete mathematical structures For computer scientists &
Mathematicians , Prentice–Hall India
4. J.P.Trembley, R. Manohar, Discrete mathematical structures with applications to computer science,
McGraw –Hill, Inc. New York, NY,1975

Course Code: **ECE – S301** **Breakup: 3 1 0 4**

Course Name: **Electronic Circuit**

Course Details:

Unit –I

Multistage Amplifiers – Effect of coupling and bypass capacitors. Low frequency response of the Common Source and Common Emitter Amplifiers. The Hybrid-pi Model of BJT, The MOSFET internal Capacitance , High frequency response of CS and CE Amplifiers, The Common Base, Common Gate and Cascode Configurations, Frequency Response of Emitter and Source Followers.

Unit-II

Feed back amplifiers and oscillators : Principles of feedback in amplifiers advantages of negative feedback. Classification of feedback, voltage series, and voltage shunt, current series. Current – shunt effect of feedback on input and output impedance. Gain, stability, noise, distortion and band width Barkhausen criterion for sinusoidal oscillators. Phase shift oscillator. Wein-bridge oscillator, Hartley oscillator, Colpitts oscillator, crystal oscillator, frequency stability.

Unit – III

D.C. Amplifier: Problems in DC amplifier, chopper amplifier, differential and common mode gain, CMRR, cascade and Darlington pair amplifier.

Unit-IV

Output stages and Power Amplifiers: Classification of Output stages A/B/AB, single-ended and Push-Pull Configuration, Power dissipation and Output Power conversion efficiencies, complimentary-symmetry Power Amplifier.
Power BJTs- Junction Temperature, Thermal resistance, Transistor case and Heat sink.
MOS Power Transistors: Structure, Characteristics, Temperature Effects, Comparison with BJTs.
Unit-V

Tuned Amplifiers:, Tuned Voltage Amplifier, stagger tuned and double tuned amplifiers, Class-C Amplifier, RF Amplifiers.

Text book:

1. Millman & Halkias/Integrated Electronics/TMH

References:

1. Shail Jain & D.R. Choudhary/Linear Integrated Circuit/PHI
2. Boylstad & Neshlshky/Electronics Devices & Circuits/PHI
3. Sedra Smith / Microelectronic /Oxford University Press

Course Code: ECE – S302 Breakup: 3 1 0 4

Course Name: Signal & Systems

Course Details:

Unit – I

Classification of signals

Introduction to signals,Periodic & non periodic, analog & digital, deterministic & random, energy & power signals. Fourier analysis: Fourier series representation of periodic signals, Fourier transform & their properties, singularity function, unit impulse, unit step. Application of Fourier transform for analysis of LTI networks the concept of frequency in continuous & discrete time domain, linear time invariant system definition. Impulse response of LTI system.
Introduction to Fourier series for discrete time periodic signals, discrete Fourier transform, DFT as a linear transformation, properties of DFT such as convolution, multiplication, duality.

Unit – II

Time and frequency characterization

Magnitude phase representation of Fourier transform, frequency response of LTI systems, time domain properties of ideal frequency selective filters, time domain and frequency domain aspects of non ideal filters.

Unit – III

Random variable & process

Random variable, random process. Correlation function (auto & cross) cumulative distribution function. Probability density function, joint cumulative & distribution and probability density.

Unit – IV

Sampling

Sampling theorem, reconstruction of signals from samples. Effect of sampling, continuous and discrete time signals, transformation of the independent variable. Continuous and discrete time systems. Basic system properties.

Unit – V

Introduction to Z transform

Region of convergence, properties of the Z transform, Inverse transform using counter integration, complex convolution theorem, Parseval's relation. Unilateral Z transform and its application to difference equation with non zero initial condition.

Textbook

1. A.V.Oppenphim, A.S.Willsky and S.H.Nawab; signals and systems, prentice Hall.
2. B.P.Lathi, Signal and sysytem, Oxford university press , New Delhi.

Reference Books:

1. Roberts, M.J. / "Signals and Systems" / Tata McGraw-Hill
2. Chen 'Signals & Systems, Oxford University, Press.

Course Code: ECE – S303T Breakup: 3 0 0 3

Course Name: Measurement & Instrumentation

Course Details:

Unit – I

Introduction of Measurement

Precision & accuracy, Characteristics of Instruments, Measurement of frequency, phase, time – interval, impedance, power measurement, energy measurement and measurement of distortion.

Unit – II

Measurement of Non – Electrical Quantities

Measurement of Temperature: Absolute Thermodynamic scale
Bimetallic element, Fluid expansion system.

Pressure: Manometers, Ring-balance manometers and Bell-type manometers, Bellows element, Bourdon Tube elements.

Force: Helical Spiral springs, Cantilever beams, Loads cells

Liquid Level: Float Element, Level to Pressure converters, Level to force converters.

Flow: Pitot-static Tube, flow obstruction elements, centrifugal Force element, static vane element ,Rotating-vane systems ,Rotameter-float Systems

Unit-III

Passive Electrical Transducers:

Resistive: Resistance Thermometers, Resistive displacement Transducers, Resistive strain Transducers, Resistive Pressure Transducers.

Inductive: Inductive thickness transducers, Inductive displacement transducers, Eddy current type Inductive transducers.

Capacitive: Capacitive thickness Transducers, Capacitive displacement Transducers

Active Electrical Transducers:

Thermo electric Transducers

Piezo-electric Transducers: Force transducers, strain transducers, Torque and pressure transducers, and photoelectric transducers.

Digital Transducers: Digital displacement transducers, Digital tachometers.

Unit-IV

Telemetry and Data Acquisition System

Telemetry: Introduction and characteristics, Landline Telemetry, Radio Telemetry

Data Acquisition: Components of Analog and Digital Data Acquisition System, Types of Multiplexing Systems, Uses of Data Acquisition System, Use of recorders in Digital systems, Modern Digital Data Acquisition System.

Unit-V

Advanced Measuring Instruments

Data Loggers, Digital Read Out Systems, Digital Input-Output devices.
Analog CRO, Digital storage CRO, Spectrum Analyzer, Logic Analyzer.

Textbook:

1. A.K. Sawhney : Electrical & Electronic Measurement & Instrumentation – DRS . India
2. M.M.S. Anand: Electronic Instruments and instrumentation Technology.

Reference:

3. Helfrick & Copper : Modern Electronic Instrumentation & Measuring Techniques – PHI
4. W.D. Cooper : Electronic Instrumentation And Measuring Techniques – PHI
5. E.O.doebilin: Measurement Systems
6. H.S.Kalsi:Electronic Instrumentation-TMH,2nd Edition.

Course Code: ECE – S303P **Breakup:** 0 0 2 1

Course Name: Measurement & Instrumentation Lab

Course Details:

List of Experiments:

1. Functional verification of
    a. weighted resistor DAC.
    b. R-2R ladder DAC.
2. Functional verification of
    a. 4-bit counter ADC.
    b. 8 bit SAR counter ADC.
3. To verify characteristics of strain gauge by plotting
    a. Graph between micro-strain versus weight.
    b. Graph between Resistance versus weight.
4. To study Linear Variable Differential Transformer (LVDT).
    a. To determine the linear range.
    b. I/P & O/P characteristics.
    c. Calibration as displacement meter and to determine the sensitivity of instruments.
    d. To determine the thickness of a given object.
    e. To study phase shift on CRO.
5. To study the characteristics of Load Cell
6. Study of Optical Transducer
    a. To study the characteristics of Filament Lamp.
    b. To study the characteristics of Photovoltaic Cell.
    c. To study the characteristics of Photoconductive cell.
    d. To study the characteristics of PIN Photodiode.
    e. To study the characteristics of Characterisitics of phototransistor.
7. Study of Temperature Transducer
    a. To study the characteristics of IC temperature sensors.
    b. To study the characteristics of Platinum RTD.
    c. To study the characteristics of NTC thermistor.
    d. To study the characteristics of NTC Bridge Circuit.
    e. To study the characteristics of K type Thermocouple.

Course Code: ECE – S304T **Breakup:** 3 0 0 3

Course Name: Microprocessors

Course Details:

Unit-I

Introduction to Microprocessor:

Evolution of Microprocessors, Register structure, ALU, Bus Organization, Timing and Control. Introduction to 8085: Architecture, Programming and Interfacing.

Architecture of 16 bit and 32 bit Microprocessor: Internal organization of 8086, Bus interface unit, Execution unit, Register organization, Sequential memory organization, Bus cycle.

Unit-II

Assembly Language Programming:

Addressing modes, Data transfer instructions, Arithmetical and logical instructions, Program control Instructions (jumps, conditional jumps and subroutine calls),Loop and string instructions, Assembler Directives.

Parameter passing and recursive procedures.

Unit- III

CPU Module Design:

Signal Description of pins of 8086 and 8088, Clock generation, Address and data bus Demultiplexing, Buffering memory organization, Read and Write cycle Timings, Interrupt structures, Minimum Mode CPU Module, Maximum Mode Operation (Coprocessor configuration)

Features of Numeric processor 8087,Floating point representation, range resolution, normalization, representation of zero, unused codes, parity bit and error detection.

Unit- IV

Basic of Interfacing:

Programmed I/O, Interrupt driven I/O, DMA(8257), Parallel I/O (8255-PPI), Serial I/O(8251/8250, RS-232 standard)

8259 Programmable Interrupt Controller, 8237-DMA Controller, 8253/8254 Programmable Timer/Counter,(8279) Keyboard and display interface, ADC and DAC interfacing.

Unit-V

Memory Interfacing:

Types of memory, RAM and ROM Interfacing with Timing consideration, DRAM Interfacing, Troubleshooting and Memory Module.

Unit-VI

An Introduction to Microcontroller 8051 : The 8051 Architecture, Instruction set,Basic Assembly language programming concept.

Textooks:

1. Douglas V.Hall/8086 Microprocessors Architecture
2. R.Gaonker/8085 Microprocessor
3. Kenneth J.Ayala/The 8051 Microcontroller/Penram International Publishing.

References:

4. Liu Gibson/Microprocessor
5. Ray, A.K. & Burchandi, K.M./ "Advanced Microprocessors and Peripherals: Architecture, Programming and Interfacing"/ Tata McGraw Hill.
6. Brey, Barry B. / "INTEL microprocessors" / Prentice Hall (India) /4th Ed.

Course Code: ECE – S304P **Breakup:** 0 0 3 2

Course Name: Microprocessors Lab

Course Details:

8085/8086 Based Experiments:

1. Signed and unsigned binary addition.
2. Signed Multiplication.
3. Signed and unsigned binary division.
4. BCD Addition and subtraction
5. Look up table method for finding the ASCII of an alpha-numeric code.
6. Interfacing with 8255 in I/O mode/BSR mode.
7. Interfacing with seven segment display.
8. Interfacing with 8253.
9. Verification of Interrupts.
10. Interfacing with ADC/DAC.
11. Mini Project on some interfacing applications.

Course Code: ECE – S305 **Breakup:** 3 1 0 4

Course Name: Electrical Engineering Materials

Course Details:

Unit – I

Crystal Structure of Materials:

A. Bonds in solids, crystal structure, co-ordination number, atomic packing factor, Miller Indices, Bragg's law and x-ray diffraction, structural Imperfections, crystal growth.

B. Energy bands in solids, classification of materials using energy band, direct and indirect band gap materials, synthesis of alloy semiconductors.

Unit – II

Conductivity of Metals:

Electron theory of metals, factors affecting electrical resistance of materials, thermal conductivity of metals, heat developed in current carrying conductors, thermoelectric effect, superconductivity and super conducting materials, Properties and applications of electrical conducting and insulating materials, mechanical properties of metals.

Unit – III

Mechanism of Conduction in semiconductor materials:

Types of semiconductors, current carriers in semiconductors, Half effect, Drift and Diffusion currents, continuity equation, P-N junction diode, junction transistor, FET & IGFET, properties of semiconducting materials.

Unit – IV

Magnetic & Dielectric Properties of Material:

Origin of permanent magnetic dipoles in matters, Classification: Diamagnetism, Para magnetism, Ferromagnetism, Anti-ferromagnetism and Ferrimagnetisms, magnetostriction, Properties of magnetic materials, soft and hard magnetic materials, permanent magnetic materials.

Effect of dielectric on the behavior of a capacitor, Polarization, Frequency dependence of electronic polarizability & permittivity, dielectric losses and loss tangent, dipolar relaxation, frequency and temperature dependence of the dielectric constant of polar dielectrics, ferro-electricity and piezoelectricity

Unit – V

Electrical Components : Different kind of resistances carbon , metal film, wire wound , capacitances : electrolytic ceramic, Inductors, transformers, audio, video RF, IF, RF chokes.

Text Books :

1 A.J. Dekker,"Electrical Engineering Materials" Prentice Hall of India
2 R.K. Rajput," Electrical Engg. Materials," Laxmi Publications.
3 C.S. Indulkar & S.Triruvagdan "An Introduction to Electrical Engg. Materials, S.Chand & Co.

References :

4 Solymar, "Electrical Properties of Materials" Oxford University Press.
5. Ian P. Hones," Material Science for Electrical and Electronic Engineering," Oxford University Press.

Course Code: ECE – S306 Breakup: 3 1 0 4

Course Name: Automatic Control System

Course Details:

Unit – I

Input/output relationship: Introduction to open loop and closed loop control systems. Mathematical representation of physical systems. Transfer functions block diagram and signal flow graph. Reduction algebra, masons gain. Time domain performance criterion, Transient response of first order, second order & Higher Order Systems.

Unit – II

Error analysis: Static and Dynamic error coefficients. Ersor criterion, frequency Domain analysis polar and inverse polar plots, bode plot, Frequency domain specifications. Relative stability gain margin and phase margin, correlation with time domain, W & N circles.

Unit – III

Stability theory: concept of stability, asymptotic & Conditional stability, Routh Hurwitz criterion, Nyquist stability criterion, Liapunova's Direct Method, Root Locus plots.

Unit – IV

Compensation Techniques: Concept Lag and Lead & lag lead Networks, Design of closed loop Systems Using compensation Techniques.

Unit – V

State Space Analysis of Control Systems: State Space Representation, Solution to Homogeneous State Equation, State Transition Matrix, Time Invariant State Equations, linear time varying systems, Controllability and Observability, Vandermonde Matrix, Decomposition of Transfer Function.

Unit- VI

Non Linear Systems: Introduction, Some Common Types of Non-Linearities, Classification of Non-Linearity,Study of Non-Linear Systems, Describing Function method of Analysis, Phase Plane Analysis, Stability Analysis with Describing Functions.

Textbooks:

1. KUO B.CI Automatic control system/Pill.
2. Ogata Kj Modern Control Engineering / PHI.
3. Nagrath I.J. & Gopal, M/Control Systems Engineering/New Age International.
4. S.N. Sivanandam/Control Systems Engineering /Vikas Publishing House Pvt. Ltd.

Course Code: ECE – S307T **Breakup:** 3 0 0 3

Course Name: Analog Integrated Circuits

Course Details:

Unit – I

Basic IC Op-Amp Fundamentals:
Brief review of differential amplifier, current mirror, active load, level shifter, output stage; ac and dc characteristics. Basic building blocks of OP – AMPS.

Unit – II

Inverting /Non-inverting VCVS, Integrators, Differentiators, CCVS and VCCS, instrumentation Amplifiers, bi-quad filter (LP, HP, BP and Notch), Oscillators. Logarithmic amplifiers, Precision rectifier, peak detector, sample and hold circuits. OP – AMP as comparator, Schmitt trigger, square and triangular wave generator, Monostable Multi-vibrator, IC Analog Multiplexer and De-multiplexer.

Unit – III

Voltage Regulators:
Transistorized series-pass Regulator, Overload short circuit and Thermal shut-down protection, OP – AMP Regulators, IC Regulators, fixed voltage regulators (78/79, XX), 723 IC Regulators (Current limiting, Current fold back); SMPS.

Unit – IV

Data Converters:
Analog to digital & DAC, weighted resistor & binary ladder D/A converters, single & dual slope integration, counter, successive approximation, resistor type A/D converters.

Unit – V
Signal generators and wave shaping circuits:
IC timer (555) applications monostable and astable operation. Ramp Generator: Triangle generator, Saw-tooth generator
PLL : Principle, definition and applications, Linear model of PLL, phase detectors, voltage controlled oscillators, loop filters, FM demodulation, using PLL digital PLL steady state, stability and transient analysis of PLL frequency synthesizer**,** Direct frequency synthesis analysis of PLL as a frequency synthesizer, direct digital synthesis.

Textbooks:
1. Sedra Smith Microelectronics/Oxford Universities Press.
2. Gayakwad/OP Amps and Linear Integrated circuits/PHI.

References:
1. C.S. Soclof/Application of analog Integrator circuits/PHI.
2. D. P. Singh /semiconductor devices and circuits /Dhanpat Rai & Co.
3. Jacob applications & Design with analog Ics/PHI 1996.

Course Code: **ECE – S307P** **Breakup:** **0** **0** **3** **2**

Course Name: **Analog Integrated Circuits Lab**

Course Details:

List of Experiments:

1. Measurement of Op-amp Parameters. (Gain, Input offset Voltage, CMRR, Slew rate).
2. Determination of Frequency response of Op-Amp.
3. Op Amp as Adder, Subtractor & Integrator, Instrumentation Amplifier
4. Precision Rectifier.
5. Instrumentation Amplifier.
6. Open Loop operation of Op-amp -Comparators - Schmitt Trigger.
7. Astable & Monostable Operation Using 555.
8. IC Voltage Regulator.
9. Voltage Controlled Oscillator.
10. Phase Locked Loop.
11. Frequency Multiplier.
12. A/D Converters & D/A Converters.
13. Second Order Active Filter- High Pass & Low Pass Realization.

Course Code: ECE – S308T Breakup: 3 0 0 3

Course Name: Communication Systems

Course Details:

Unit-I

Communication System
Elements of communication System and its Fundamental limitations,. Need of Modulation.
Random Processes
Random Process, Stationary Processes, Ergodic Processes, Transmission through LTI, Power spectral density, Gaussian process.
Noise
External and internal sources of noise, Thermal noise, Calculation of thermal noise, Shot noise, Noise figure, Noise temperature, Equivalent noise bandwidth.

Unit-II

Amplitude(Linear Modulation)
Generation and detection of DSB, SSB, VSB, Carrier Acquisition, Concept of FDM,
AM transmitter and Receiver
Unit-III

Angle(Exponential Modulation)
Types of Angle Modulation, Concepts of Instantaneous frequency,Wideband and Narrowband FM, Generation and detection of FM, Generation and detection of PM, FDM
Unit-IV

Noise performance of CW Modulation Systems
Noise in DSB-SC, SSB-SC and AM system, Noise in FM and PM
FM threshold and its extension, Pre-emphasis and De-emphasis in FM
Unit-V

Sampling theory & pulse modulation
Sampling process, sampling theorem, signal reconstruction, flat top sampling of band pass signals, Analog Pulse Modulation: Types of analog pulse modulation, Method of generation and detection of PAM, PWM, PPM, Spectra of pulse modulation, concept of time division multiplexing.

Text books:

1. Communication Systems S. Haykin, John Willy & Sons.
2. Communication Systems: A.B. Carlson, Mc-Graw-HW.
3. Modem Analog & Digital Communication Systems : B.P. Lathi; Oxford Univ. Press.
4. Analog Communication Systems : Pchakrabarti Dhanpat Rai.

References Books:

1. Taub, Herbert & Schilling, Donald L. / "Communication Systems" / Tata McGraw-Hill
2. Carlson, A. Bruce, Crilly, Paul B. & Rutledge, Janet C. / "Communication Systems an Introduction to Signals & Noise in Electrical Communication"/ Tata McGraw-Hill.
3. Kennedy, George & Davis, Bernard / "Electronic Communication Systems" / Tata McGraw-Hill / 4th Ed.
4. Singh, R.P. & Sapre, S.D. / "Communication Systems: Analog & Digital" / Tata McGraw- Hill.

Course Code: **ECE – S308P** **Breakup:** **0** **0** **3** **2**

Course Name: **Communication Systems Lab**

Course Details:

List of Experiments:

1. Generation of AM Signal and measurement of Modulation Index.
2. Envelop Detector for AM Signals
3. Generation & Detection of DSB-SC Signal.
4. SSB Generation.
5. To study the Varactor modulator.
6. To study the Reactance modulator.
7. Detection of SSB signal
8. Generation of NBFM Signal.
9. Generation of FM Signal.
10. FM Detector using PLL.

Course Code: ECE – S309 Breakup: 3 1 0 4

Course Name: Antenna and Microwave Engineering

Course Details:

Unit-I

Antenna Principles

The Alternating Current Element, Electric and Magnetic Fields due to Alternating current element, Application to short antennas, Radiation from Monopole and Half-wave Dipole, Assumed current distribution.

Antenna Fundamentals: Application of Network Theorems to antennas, Equivalence of Directional Patterns, Equivalence of Transmitting and Receiving antenna impedances, Equality of effective lengths using Reciprocity Theorem, Directional properties of Dipole Antennas, Antenna Gain, Directivity, Effective Area, Antenna Terminal Impedance, Antenna as an Opened Out Transmission Line, Practical Antennas and Methods of Excitation, Transmission loss between antennas, Antenna Temperature and Signal to Noise Ratio.

Unit-II

Antenna Arrays

Two-Element Array, Horizontal Patterns in Broadcast Arrays, Linear Arrays, Broad-side and End-fire, Multiplication of Patterns, Effect of Earth on Vertical Patterns, Binomial array, Tchebycheyff Distribution Array.

Unit-III

Wave Propagation

Modes of Propagation, Plane Earth Reflection, Surface Wave, Field strength, Elevated Dipole Antennas above a Plane Earth, Wave tilt of the Surface Wave, Spherical Earth Propagation, Tropospheric Wave.

Ionosphere Propagation, Sky Wave Transmission Calculations, Effect of the Earth's Magnetic Field, Virtual Height, MUF/LUF, Skip distance, Ionospheric Variations and Fading.

Space Waves: Radio Horizon, Microwave space wave Propagation, Duct Propagation.

Unit-IV

Wave Guides

Guided waves between parallel plates, Dielectric slab Waveguide, Rectangular, Circular waveguides, Transmission Line Analogy for waveguides,.

Microwave Components

Waveguide couplings, bends and twists, tees, transitions, matched load, Attenuators and phase shifters, wave guide discontinuities, windows Irises and tuning screws, Two-hole directional coupler, Isolators and circulators.

Unit-V

Microwave Generation

Limitations of Conventional Vacuum Tubes, Klystron(Reflex and Multi-cavity), TWT, Magnetrons, and BWO, **Negative conductance Microwave devices**: Tunnel diode, Gunn diode, IMPATT diode

Text books:

1. Jordan and Balmian,**'Electromagnetic waves and radiating sytems'**,PHI.
2. K.D.Prasad,**'Antenna and Wave propogation'**,Pragati Prakashan,2009
3. Liao,Y, "**Microwave Devices and Cricuits**", Prentice Hall of India.
4. S.Kulkarni," **Microwave Engineering**" ,Umesh Publication,2009.

References:

1. Reich, "**Microwave principles**", CBS, 1996.
2. Collin, "**Foundation of Microwave Engineering**", 2nd cd. McGraw Hill, 1992.
3. Watson, "**Microwave Semiconductor Devices and Their Circuit Applications**", McGraw Hill.
4. J.D.Krauss,'**Antennas**',TMH.

Course code: HSS – S301 **Breakup:** **1 – 1 – 1 – 2**

Course Name: Professional Communication

Course Details:

Unit 1- Presentation Techniques

- Meaning and importance of presentation technique
- Use of presentation techniques in everyday life
- Presentation skills required for business organization
- Types of business presentations-meetings, seminars, Conferences

Unit 2-Oral presentations

- Effective oral presentation techniques
- Tips for good oral delivery; debates, elocution, impromptu speeches
- Levels and models of organizational Communication
- Interviews-types of interviews
- Group discussions

Unit 3- Written communication

- Style and tone of writing business messages and Documents.
- Writing for websites, internet e-mails and short messages
- Applications, letters, memos
- Proposals and report writing

Unit 4 - Nonverbal presentations

- Nonverbal communication techniques
- Business manners, ethics and personality development
- Audio/visual presentations, power point presentations
- Art of delivery

Unit 5- Literary concepts

- Stories, essays, comprehension
- Reading techniques-skimming and scanning methods
- Listening skills

Recommended Books:

1. "Business Communication Today", Bove'e, Thill and Schatzman: Pearson Education(Singapore),2003

2. "Business Communication-a framework of success", H.Dan O'Hair, James S.O'Rourke and Mary John O' Hair: South Western College Publishing 2001.

3. "Basic Business Communication", Raymond V.Lesikar, Marie E.Flatley: Tata McGraw Hill Publishing Company Ltd., 2002.

Course Code: HSS-S201 **Breakup: 3 – 0 – 0 –4**

Course Name: Industrial Management

Course Details:

Introduction to Industrial management, Brief history of industries in India, Brief definition of management, organization and administration. Characteristics of management, Principle of management, Function of management like, planning, organization, direction, co-ordination etc.

Level of management, skills of management, inter relation between skills and levels of management, scientific management, Introduction to Schools of Management thoughts, introduction to organization, study of basic type of organization for ex. Line and staff organization, project organization, metrics organization, Informal organization, Introduction to industrial Psychology, Motivation theory and study of Maxlow, Need, Hierarchy Theory, Planned Location, Planned Layout. Study of different forms of layout like line layout, process layout, product layout, combinational layout, sixth position layout etc.

Objective of planned layout, introduction to material management, scope of material management, study of inventory control method, introduction to different types of inventory control techniques, introduction to work study, motion study etc, introduction to conflict management.

Text Book and References:

1. Khanna O.P. : Industrial Engineering
2. T.R. Banga : Industrial Engineering and Management
3. Mahajan : Industrial and Process Management

Course Code: ECE – S401T Breakup: 3 0 0 3

Course Name: Digital Communication

Course Details:

Unit – I

Elements of Digital communication and information theory : Model of a digital communication system ; logarithmic measure of information, entropy and information rate, conditional entropy and redundancy, source coding fixed and variable length code words, Source coding theorem, prefix doing and craft inequality, Shannon – fano and Huffman coding for 1^{st} , 2^{nd} and 3^{rd} order extensions, maximum entropy of a continuous source(with Gaussian distribution) entropy of a band limited white Gauusian noise, Mutual information and channel capacity of a discrete memory less channel, of a BSC, Hartley Shannon law.

Unit –II

Waveform coding techniques : Discretization in time and amplitude. Linear quantizer, quantization noise power calculation, signal to quantization noise ratio, non – uniform quantizer, A law & μ law companding ;encoding and pulse code modulation, bandwidth of PCM, Differential pulse code modulation, Delta modulation, Idling noise and slope overload, Adaptive delta modulation, adaptive DPCM. Comparison of PCM and DM, MPEG audio coding standard.

Digital multiplexing : Fundamentals of time division multiplexing, electronic commutator, bit, byte interleaving E1 Carrier system, Synchronization and signaling of E1, TDM, PCM hierarchy.

Unit – III

Digital Baseband transmission : line coding and its properties. NRZ & RZ types, signaling format for Unipolar, polar, bipolar, AMI & Manchester coding and their power spectra (No derivation), HDB and B&W signaling, ISI, Nyquist criterion for zero ISI & raised cosine spectrum. Matched filter receiver, derivation of its , impulse response and peak pulse signal to noise, correlation detector decision threshold and error probability for binary Unipolar (on – off), signaling.

Unit – IV

Digital modulation techniques: Types of digital modulation, wave forms for amplitude, frequency and phase shift keying. Method of generation and detection of coherent & non – coherent binary ASK, FSK & PSK, differential phase shift keying, Quadrature modulation techniques (QPSK and MSK) probability of error and comparison of various digital modulation techniques.

Unit – V

Error control coding: Error free communication over a noisy channel, Hamming sphere, hamming distance and hamming bound, relation between minimum distance and error detecting and correcting capability, linear block codes, encoding & syndrome decoding ; cyclic codes, encoders and decoders for systematic cycle codes ; convolutional codes, code tree & Trellis diagram, Viterbi and sequential decoding, burst error correction, comparison of performance.

Textbooks:

1. P. Lathi/Modern Analog 86 Digital Communication/ Oxford Univ Press.
2. Simon Haykin /Digital Communication /John Wiley.
3. Simon Haykin/Communication Systems. John Wiley Qv Edn.

References Books:

1. Taub & Schilling / "Principles of Communication Systems" / Tata McGraw-Hill /
2. Singh, R.P. & Sapre, S.D. / "Communication Systems: Analog & Digital" / Tata McGraw-Hill.
3. A.B. Carlson / "Communication Systems" / Tata McGraw-Hill.
4. Prokis J.J / "Digital Communications" / McGraw Hill /
5. Schaum's Outlines / "Analog & Digital Communication" / Tata McGraw-Hill.
6. Kennedy, George & Davis, Bernard / "Electronic communication systems" / Tata McGraw-Hill

Course Code: **ECE – S401P** **Breakup:** **0** **0** **3** **2**

Course Name: **Digital Communication Lab**

Course Details:

List of Experiments:

1. Sample and hold circuit.
2. To study the analog signal, sampling and reconstruction.
3. PAM, PWM, PPM generation and detection.
4. Delta modulation and detection.
5. Pulse data coding and decoding techniques for NRZ formats
6. ASK, FSK, PSK modulation and detection
7. Single bit error detection and correction.
8. PCM Modulation and detection

Course Code: ECE – S402 Breakup: 3 1 0 4

Course Name: Data Communication

Course Details:

Unit-I

1. **Data transmission basics:** Review of digital data analog modulation and digital formats. Data rates, baud rates, channel capacity, mediums for communication. Synchronous and asynchronous data communication.
2. ISO – OSI model and TCP/IP model of network, protocols and services, connection oriented and connectionless service, their interpretation at different layers. Quality of services. Design issues for different layers.
3. **Physical Layer**: Design issues, Data link layer design issues, services provided to network layer framing necessity and techniques. Error control feature and review of techniques. Flow control; sliding window protocols: go back and selective repeat. Example data link protocols SLIP, PPP

Unit – II

Medium access sub layer: in broadcast channels. ALOHAS analysis, CSMA protocols, collision detection. Collision free protocols : binary countdown, limited contention protocols adaptive tree walk compromise between high load channel. Utilization and low load delay.

Unit – III

Examples of IEEE 802.3, 802.4, 802.5, 802.6 LAN/MAN framing, medium, operation and MAC 802.3 performance switches. Fast Ethernet, bridges 802.2 LLC, FDDI wireless LAN MEE 802.11.

Unit – IV

Network layer: Services provided to transport layer. Routing algorithms : Dijkstra's algorithm for shortest path, flooding, flow based routing, distance vector routing, link stat routing hierarchal routing, routing for mobile hosts congestion control : in virtual circuits subnets : choke packets, Internetworking . Internet IP addresses IP protocol basics.

Unit – V

Transport layer: Services provided to the upper layers. Elements of transport protocols establishing: addressing and releasing connection and flow control and buffering Introduction to network security.

Textbooks:

1. Computer Networks by Tanenbum/PHI.
2. Data Networks: Bertsekas & Gallager.

Reference Books :

1. Bertsekas & Gallager / "Data Networks" /Prentice Hall (India)
2. Black U. / "Computer Networks: Protocols, Standards and Interfaces" / Prentice Hall (India) / 2nd Ed.
3. Shay, William A. / "Understanding Data communications & Networks" / Vikas Publishing House Pvt. Ltd.

Course Code: ECE – S403T **Breakup:** 3 0 0 3

Course Name: Digital Signal Processing

Course Details:

Unit-I

Introduction

Limitations of analog signal processing, Advantage digital signal processing, discrete time characterization of signals & systems some elementary discrete time sequences and systems, concepts of stability, causality, linearity time invariance and memory, linear time invariant systems, and their properties, linear constant coefficient difference equations.

Frequency domain representation of discrete time signal and systems complex exponentials as eigan function of LTI systems, Fourier transform of sequences.

Unit-II

Processing of continuous time signals

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 .

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 using decimation in time and decimation in frequency techniques ; linear filtering approaches to computation of DFT.

Unit-III

Transform analysis of LTI systems

Frequency response of LTI systems, system function for system characterized by linear constant coefficient difference equations. Relationship between magnitude and phase ; all pass systems, minimum phase systems.

Structure for discrete time systems

Signal flow graph representation, transposed forms, lattice structures.

Unit-IV

Design of digital filters

Linear phase FIR filters; FIR differentiator and Hilbert transforms , FIR filter design by impulse invariance, bilinear transformation ; Matched Z – transformation ; frequency transformation in the analog and digital domain.

Unit-V

Finite precision effects

Fixed point and floating point representations, effect of coefficient quantization, effect of round off noise in digital filters, limit cycles.

Digital signal processors

Architecture and various features of TMS/ADSP, series of digital signal processors; Instruction set and few applications of TMS 320CXX.

Textbooks:

1. Oppenhiem, A.V & Sachsfer R.W, "Discrete Time Signal Processing" Prentice Hall, 1989.
2. Proakis, J.G & Manolakis, D.G, "Digital Signal Processing" Prentice Hall 1992.

Reference Books:

1. Rabiner, L.R. and Gold B./ "Theory and applications of DSP" / Prentice Hall (India)
2. Oppenheim, Alan V. & Willsky, Alan S. / "Signals and Systems" / Prentice Hall (India) / 2nd Ed.
3. Johnson, J.R. / "Introduction to Digital Signal Processing" / Prentice Hall (India)
4. DeFatta, D.J., Lucas, J.G. & Hodgkiss, W.S / "Digital Signal Processing"/ John Wiley & Sons.
5. Sen M. Kuo & Woon-Seng S. Gan, "Digital Signal Processors-architectures, implementation and applications" / Pearson Education / Ist Ed. /

Course Code: ECE – S403P **Breakup: 0 0 3 2**

Course Name: Digital Signal Processing Lab

Course Details:

List of Experiments:

1. Sampling & Waveform Generation.
2. Plot the different sequences using MATLAB tools:-
   (i) Unit step sequence (ii) Unit Impulse Sequence (iii) Unit Ramp Sequence
3. Quantization
4. Circular convolution of sequences.
5. Periodic convolution of sequences.
6. DFT Computation.
7. Fast Fourier Transform Implementation.
8. FIR Filter implementation.
9. IIR Filter implementation.
10. Computational Experiments with Digital Filters.

Course Code: ECE – S404T **Breakup: 3 0 0 3**

Course Name: Wireless & Mobile Communication

Course Details:

Unit-I

Introduction: History of wireless communication, Evolution of Mobile Communication, Mobile and Wireless devices. A market for mobile communications. A simplified reference model for mobile communications, Large scale path loss: propagation models, reflection, diffraction, scattering, practical link budget design using path loss model.

Wireless-transmission: A brief introduction of frequencies for radio transmission, signals propagation, Multiplexing, Modulation, spread spectrum, cellular system, Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems, Small scale fading & multipath propagation and measurements, impulse response model and parameters of multipath channels, types of fading, theory of multi-path shape factor for fading wireless channels.

Unit-II

Spread spectrum modulation techniques: Pseudo-noise sequence, direct sequence spread spectrum (DS-SS), frequency hopped spread spectrum(FHSS), performance of DS-SS, performance of FH-SS, modulation performance in fading and multipath channels, fundamentals of equalisation, equaliser in communication receiver, survey of equalisation techniques, linear equaliser, linear equaliser, non-linear equalisation, diversity techniques, RAKE receiver.

Medium Access Control: Introduction to MAC, Telecommunication systems, GSM, DECT, TETRA, UMTS & IMT-2000

Unit-III

Satellite System: Review of the System, Broadcast System-Review.

Wireless LAN: IEEE 802-11 Protocol, System Architecture, Protocol Architecture, Physical Layer & MAC Layer, Newer developments, Hiper LAN, Bluetooth Technology, Introduction to wireless networks, 2G, 3G wireless systems, wireless standards.

Unit-IV

Mobile Network Layer: Mobile IP, Mobile host configuration Network, Mobile ad-hoc networks

Mobile transport Layer: Traditional TCP, classical TCP improvement TCP over wireless network, performance Enhancing, proxies

Support for Mobility: File systems, World Wide Web, wireless application protocol, i-mode, Sync ML, WAP2-0 etc. Architecture of future Network & Applications.

Text Book:

1. Schiller, J. / "Mobile Communication" / Pearson Education / 2nd Ed.
2. T.S. Rappaport, "Wireless Communication-Principles and practice", Pearson

Reference Books:

1. Willium C. Y. Lee, "Mobile communication Design and fundamentals"
2. D. R. Kamilo Fehar, "Wireless digital communication"
3. Haykin S & Moher M., "Modern wireless communication", Pearson, 2005.

Course Code: ECE – S404P **Breakup: 0 0 3 2**

Course Name: Wireless & Mobile Communication Lab

Course Details:

List of Experiments:

1. Selection and study of various PN code (MLS, GOLD, BARKER).
2. Generate (spreading) DS-SS modulated signal.
3. To demodulate (dispreading) DS-SS modulated signal.
4. Selection & comparative study of various code modulation techniques: BPSK/ QPSK/ OQPSK.
5. Modulation and Demodulation using internal generation of 2047 bit PN sequence as modulator Input and Unmodulated carrier.
6. Spreading and Despreading using Additive white Gaussian Noise Generator and frequency offset.
7. Voice communication using DSSS.
8. To set up Active Satellite link.
9. Study satellite transponder.
10. Generation & Detection of VSB signal.
11. Measurement of VSWR
12. Study of Characteristics of Reflex Klystron and Gunn Oscillator.
13. Measurement of coupling Coefficient and directivity of a directional coupler
14. Study of insertion and coupling Coefficient of Magic Tee
15. Directional pattern of different antennas.

Course Code: ECE – S405T **Breakup: 3 0 0 3**

Course Name: Optical Communication

Course Details:

Unit –I

Overview of optical fiber wave guides

General system, transmission link, advantage of optical fiber communication,basic structure of optical fiber waveguide, ray theory transmission, optical fiber modes and configuration, step index & graded index fiber, single mode fiber , fiber materials , fiber fabrication.

Unit – II

Signal degradation in optical fiber

Introduction, attenuation , intrinsic & extrinsic absorption losses, linear & nonlinear scattering losses , bending losses , distortion in optical wave guide , intramodal and intermodal dispersion.

Power launching and coupling

Source to fiber power launching, power calculation , lensing schemes , fiber to fiber joints , fiber splicing technique , fiber connectors.

Unit – III

Optical sources

LASER: Basic concepts of laser, Optical emission from semiconductors, Semiconductor injection laser (ILD), Injection laser characteristics.LED: power and efficiency, LED structures, LED characteristics.

Optical detectors: p-n photodiodes, p-i-n photodiodes, Avalanche photodiodes, Quantum efficiency, speed of response, Phototransistor.

Unit – IV

Optical receiver

Receiver operation, digital receiver noise , shot noise , pre-amplifier types , Digital receiver performance, introduction to analog receivers.

Unit – V

Digital transmission systems

Point to point links, system considerations, link power budget, rise time budget, modulation formats for analog communication system, introduction to WDM concepts, Introduction to advanced multiplexing strategies.

Textbooks:

1. G.Keiser: Optical Fiber Communication – MGH
2. Jenkins & White : Fundamentals Of Optics – MGH
3. J.M. Senior : Optical Fiber Communication – PHI
4. Gagliardi & Karp: Optical Communication – Wiley

Reference Books:

1. Bhattacharya, Pallab / "Semiconductor Optoelectronics Devices" / Pearson Education.
2. Singh, Jasprit / "Optoelectronics An Introduction to Materials and Devices"/ McGraw-Hill
3. Khare, R.P. / "Fiber Optics & Optoelectronics" / Oxford University Press
4. Gupta, S.C. / "Text Book of Optical Fiber Communication & Its Applications"/ Prentice–Hall (India).

Course Code: ECE – S405P **Breakup: 0 0 2 1**

Course Name: Optical Communication Lab

Course Details:

List of Experiments:

1. Voice transmission through optical link.
2. AM system using analog & Digital Input Signals.
3. Frequency Modulation System.
4. Pulse Width Modulation system.
5. Study of Propagation Loss in optical fiber System.
6. Study of Bending Loss.
7. Measurement of Numerical Aperature.
8. Charateristics of E-O Converter (LED)
9. Fiber optic digital link.
10. PC to PC communication Link using optical fiber.

Course Code: ECE – S406 **Breakup: 3 1 0 4**

Course Name: VLSI Technology & Design

Course Details:

Unit-I

Crystal Growth & Wafer Characterization: Electronic Grade Silicon, CZ Crystal Growing, Silicon Shaping, Processing Consideration.

Epitaxy: Vapor Phase Epitaxy, Molecular Beam Epitaxy, Silicon on Insulators.

Oxidation: Growth Mechanism, Oxide Properties, Oxidation Induced Defects

Lithography: Optical Lithography, Electron Lithography, X-Ray Lithography, Ion Lithography

Reactive Plasma Etching: Feature Size Control and Anisotropic, Etch Mechanisms, Reactive Plasma Etching Techniques and Equipment

Unit-II

Diffusion: Models of Diffusion in Solids, Fick's One Dimensional Diffusion Equations, Atomic Diffusion Mechanisms

Ion Implantation: Range Theory, Implantation Equipment, Annealing

Metallization: Metallization Applications, Metallization Choice, Physical Vapour Deposition, Patterning, Bipolar IC Technology

Unit-III

Introduction to MOS: MOS, CMOS IC Technology, Metal Gate, Poly Silicon Gate, P-Channel, N-Channel Devices, Enhancement Mode and Depletion Mode Devices and their Characteristics.

Unit-IV

VLSI design Introduction: Issues in Digital Integrated Circuit Design, Quality Metrics of a Digital Design

The Manufacturing Process: Manufacturing CMOS Integrated Circuits, Design Rules, IC Layout, Packaging Integrated Circuits, Spice Diode Model, The MOSFET Transistors: The MOS Transistor Under Static Condition, Secondary Effects, Spice Models For the MOS Transistors, Scaling, Circuit Simulation

Unit- V

The CMOS Inverter: The Static CMOS Inverter, Performance of CMOS Inverter, Power, Energy and Energy Delay

Designing Combinational Logic Gates in CMOS: Static CMOS Design, Dynamic CMOS Design, Simulation and Layout Techniques for Logic Gates

Designing Sequential Logic Circuits: Static Latches and Register, Dynamic Latches and Register.

Unit-VI

Designing Arithmetic Building Blocks

Data paths in Digital Processor Architectures, Adders, Multiplier, Shifter, Other Arithmetic Operators, designing memories, Power and Speed Trade-offs in Data path Structures.

Implemantation Strategies for Digital ICs

Introduction, From custom to semi-custom and structure-array Design Approaches, Custom Circuit Design, Cell based Design Methodology, Array based Implementation Approaches.

Unit-VII

Architecture Design:

VHDL, Register-Transfer Design, High Level Synthesis.

Text Book Reference:

1. Rabaey, John. M. and Chandrakasan, Anantha and Nikolic, Borivoje / "Digital Integrated Circuits, A Design perspective" / Pearson Education / 2nd Ed.
2. Wayne, Wolf / "Modern VLSI Design- Systems on Silicon" / Addison-Wesley / 2nd Ed.
3. Sze, S.M./ "VLSI Technology" / Tata McGraw-Hill / 2nd Ed.
4. Streetman, B.G. & Banerjee, Sanjay / "Solid State Electronic Devices"/ Prentice Hall (India) / 5th Ed.
5. Kang, Sun-mo and Leblebici, Yusuf / "CMOS Digital integrated Circuits, Analysis & Design"/ Tata McGraw-Hill /
6. Pucknell, Douglas A. and Eshraghian, Kamran / "Basic VLSI Design"/ Prentice – Hall (India).
7. Razavi, Behzad / "Design of Analog CMOS integrated circuits" / Tata McGraw-Hill.
8. Weste, N.H.E. & Eshraghian, K. / "Principles of CMOS VLSI Design" / Pearson Education Asia

Departmental Electives-I

Course Code: ECE – S501 Breakup: 3 1 0 4

Course Name: Power Electronics

Course Details:

UNIT I **Power semiconductor Devices:**
Power semiconductor devices their symbols and static characteristics. Characteristics and specifications of switches, types of power electronic circuits. BJTO operation steady state and switch characteristics, switching limits. Operation and steady state characteristics of MOSFET and IGBT. Thyristor – Operation V- I characteristics, two transistor model, methods of turn-on Operation of GTO, MCT and TRIAC

UNIT II
Power Semiconductor Devices (Contd)
Protection of devices. Series and parallel operation of thyristors,
Commutation techniques of thyristor
DC-DC Converters:
Principles of step-down chopper, step down chopper with R-L load,Principle of step-up chopper, and operation with RL load, classification of choppers.

UNIT III
Phase Controlled Converters
Single phase half wave controlled, rectifier with resistive and inductive loads, effect of freewheeling diode.
Single phase fully controlled and half controlled bridge converters.
Performance Parameters, Three phase half wave converters, Three phase fully controlled and half controlled bridge converters, Effect of source impedance, Single phase and three phase dual converters.
Resonant converters

UNIT IV
AC Voltage Controllers
Principle of On-Off and phase controls, Single phase ac voltage controller with resistive and inductive loads.
Three phase ac voltage controllers (various configurations and comparison), Single phase transformer tap changer.
Cyclo-Converters, Basic principle of operation, single phase to single phase, three phase to single phase and three phase to three phase cyclo-converters, output voltage equation

UNIT V
Inverters
Single phase series resonant inverter, Single phase bridge inverters, Three phase bridge inverters
Voltage control of inverters, Harmonics reduction techniques, Single phase and three phase current source inverters.

Text Books:
1. M.H. Rashid,"Power Electronics: Circuits, Devices & Applications", Prentice Hall of India Ltd. 3rd Edition,2004.
2. M.D. Singh and K.B.Khanchandani, "Power Electronics"Tata MC Graw Hill, 2005

Reference Books:
1. M.S. Jamil Asghar, "Power Electronics" Prentice Hall of India Ltd., 2004
2. A. Chakrabarti,rai & Co. "Fundamentals of Power Electronics &Drives" Dhanpat Rai.
3. K.Hari Babu , "Power Electronics" Switch Publications.

Course Code: ECE – S502 Breakup: 3 1 0 4

Course Name : Microprocessor Based Instrumentation

Course Details:

Unit – 1
Introduction : review of Architecture & Assembly language programming of 8086, Memory Interfacing, data transfer techniques and their implementation.

Unit – 2
Common peripherals and their interfacing : single chip microcontrollers – 8051 family and 8086 architecture, instruction set and programming.

Unit – 3
Buses : types of buses IEEE 488, MULTI bus, MIL – STD – 1553 Bus contronix standard, serial bus standards.

Unit – 4
Interfacing I/O Devices : Interfacing of keyboards, Display(using 8279), power devices, optical motor shaft encoders, ADCs & DACs to microcontrollers, microcontroller based scale.

Unit – 5
Process control applications : Data Acquisition, temperature scanners, temperature controller, Flow control & level control, signature Analyzer using a logic analyzer for Trouble shooting.

Textbooks:

1. Intel data sheets
2. DV Hall/microprocessor and interfacing/TMH.
3. B.P.Singh/advanced microprocessor and microcontrollers/new age.
4. B.P.Singh/microprocessor Interfacing and application/New age International.
5. Richard A.cox/Technician's guide to programmable controller/Vikas publishing house.

Course Code: ECE – S503 Breakup: 3 1 0 4

Course Name : Multimedia Communication

Course Details:

Unit –1

The communication requirement associated with the different types of multimedia applications such as video telephony/teleconferencing, Electronic mail, interactive TV, Electronic commerce, Web TV.

Unit – 2

Multimedia information representation, Text and image compression, standards for multimedia communications.

Unit – 3&4

Digital communication basics, operation of different kinds of networks, The internet, Broadband ATM networks, Entertainment networks, high speed mdems.

Unit – 5

New communicatrion protocols for use with these networks to meet the requirements of multimedia application, transport protocols, application support functions, Internet applications, The world wide web (WWW).

Textbooks:

1. Fred Halsoll/Multimedia communications : Applications, Networks, protocols and standards/Pearson education, Asia.
2. Jean Walrand & Pravin Varaiya/High performance communication networks/Harcourt Asia PTE Ltd.
3. Jarnes E. Shuman/Multimedia in action/Vikas Publishing house Pvt. Ltd.

Course Code: ECE – S504 Breakup: 3 1 0 4

Course Name : T.V.Engineering

Course Details:

Unit – 1

Basic television principle
Introduction, audio and video transmission, scanning principle , TV broadcasting, system , transmission & reception, Aspect ratio, Resolution, Video bandwidth.
Composite Video Signal
Video signals, composite video signal, blanking signal, horizontal & vertical blanking and sync pulses, Colour synchronizing signal.

Unit –2

Television Cameras
Introduction, Image orthicon, Vidicon , plumbicon , characteristics of camera tubes, video processing of camera pick – up signal, comprison of camera tubes.

Unit – 3

TV Transmitter
Video modulation, vestigial sideband transmission, standard TV channels Characteristics, TV transmitter, TV standards.
Receiver
Introduction , Block diagram, Receiver controls, RF tuners, Video channel and picture tube, AGC and synchronization circuits, Deflection circuit (Horizontal and vertical), video detector, Sound section.

Unit – 4

Colour TV Principles
Introduction, compatibility, colour fundamentals, chromaticity diagram, colour picture tubes (Delta – gun, P.I.L, & trintron), purity and convergence.
Colour Signal Transmission and Reception
Introduction, modulation of colour difference signals, formation of chrominance signal, Introduction of NTSC, PAL and SECAM colour system.
Unit 5
Introduction to HDTV and digital TV system
TV displays LCD and Plasma.

Textbooks:

1. Dome : Television Principles - MGH.
2. Hutson G.H.: Television receiver theory – Arnolds press.
3. Television Engineering : R.R. Gulati – New age Int.
4. M.Mandal : Modern television system – PHI

Course Code: ECE – S505 Breakup: 3 1 0 4

Course Name : Artificial Intelligence

Course Details:

Unit – 1

Introduction to Artificial Intelligence. Natural and artificial intelligence. Role of representation of knowledge, Description matching and goal reduction, exploiting natural constraints in problem solving, Exploiting alternative paths, Best paths.

Unit – 2

Reasoning , Logic and Theorem proving : Deductive and inductive reasoning . heuristic methods , proof by resolutions and constraint propagation, problem solving paradiagrams.

Unit – 3

Knowledge replacement : First order predicate calculus, Skolemlsation , Resolution principle, Unification nementic networks, frame , system value inheritance, introduction to prolog, Introduction to expert systems, application of expert system and various shells.

Unit – 4

Application of artificial intelligence methods in various disciplines: database management, computer aided.

Textbooks:

1. Elaine Rich, Kelvin Knight/Artificial Intellegence/TMH
2. Nilsson, N.J/Principle of artificial Intellegence 1980
3. Barr, A, E.A. Feigenbaum/Handbook of Artificial Intellegence.

Course Code: ECE – S506 Breakup: 3 1 0 4

Course Name : Advanced Semiconductor Devices

Course Details:

Unit – 1

Bonding in solids ,Energy Bands, metal-semiconductor and ,Direct and Indirect semiconductors, Variation of energy bands with alloy composition, charge carriers in semiconductors, effective mass, Intrinsic and Extrinsic materials., The Fermi level & Fermi dirac distribution, Electron and Hole in quantum well, Change of electron-hole concentration Qualitative and Quantitative analysis, Temperature dependency of carrier concentration, conductivity and mobility, effects of temperature and doping on mobility, high field effects, the hall effects, Invariance of the Fermi level at equilibrium.

Unit – 2

Optical absorption, Luminescence, photoluminescence and electroluminescence, Direct and Indirect recombination, trapping, steady state carrier generation and Quasi Fermi levels, Diffusion and drift, diffusion length, diffusion and recombination. Gradient in the quasi-Fermi levels. Radiation in semiconductors, deep level transition, auger recombination, measurement of absorption and luminescence spectra.

Unit – 3

Fabrication of PN junctions, Different types of junction –grown junction, alloyed junction, diffused junction ,Ion implanted junction, Epitaxial junctions.

Current flow at junction, contact potential ,space charge, carrier injection, Zener and Avalanche breakdowns, capacitance of junctions, depletion layer. switching diodes, rectifying and ohmic contacts, schottky diodes, varactor diodes.

Unit – 4

BJT-General characteristics, specification for switching transistors, thermal effects, kirk effects, transit effects, Webster Effect, Heterojunction Bipolar transistors.

Field effect transistors, the junction FET, V-I characteristics, MESFET, Basic operation, the ideal MOS capacitor,

threshold voltage, V-I characteristics of MOS gate oxides, MOSFET, output characteristics, transfer characteristics, Mobility Model, control of threshold voltage, power MOSFETS ,CMOS structure

Unit – 5

Photodiode,solar cell ,Phototransistor & Photomultipliers, LEDs , multilayers Heterojunction for LEDs, Semiconductor lasers, operating principles, Heterojunction laser, Distributed feedback lasers, Negative conductance microwave devices – Tunnel diode,IMPATT diode, Gunn diode, QWITT diode, TRAPATT diode and circuit application.Power electronic devices- The pnpn diode , SCR, GTO, IGBT, operation and characterisitics.

Textbooks :

1. B.G. Streetman/Solid State Devices /PHI.
2. Millman & Halkias/Integrated Electronics/PHI.
3. S.M. Sze/Semiconductor Devices : Physics And Technology/John Wiley.

Departmental Electives-II

Course Code: ECE – S507 Breakup: 3 1 0 4

Course Name : Information Theory And Coding

Course Details:

UNIT I

Source Coding: Introduction to Information Theory, Uncertainty and Information, Average Mutual Information and Entropy, Information Measures for Continuous Random Variables, Source Coding Theorem, Huffman Coding, The Lempel- Ziv Algorithm, Rate Distortion Function, Optimum Quantizer Design,

UNIT II

Channel Capacity and Coding: Introduction, Channel Models, Channel Capacity, Channel Coding, Information Capacity Theorem
The Shannon Limit, Random Selection of Codes,

UNITIII

Linear Block Codes for Error Correction: Introduction to Error Correcting Codes, Basic Definitions, Matrix Description of Linear Block Codes, Equivalent Codes, Parity Check Matrix, Decoding of a Linear Block Code, Syndrome Decoding, Error Probability after Coding (Probability of Error Correction), Perfect Codes
Hamming Codes, Optimal Linear Codes, Cyclic Codes, Introduction to Cyclic Codes, Polynomials
The Division Algorithm for Polynomials, A Method for Generating Cyclic Codes, Matrix Description of Cyclic Codes, Fire Code, Golay Codes, Cyclic Redundancy Check (CRC) Codes
Introduction to BCH Codes, Primitive Elements, Minimal Polynomials, Generator Polynomials in Terms of Minimal Polynomials, Some Examples of BCH Codes, Decoding of BCH Codes
Reed-Solomon Codes, Implementation of Reed-Solomon Encoders and Decoders
Nested Codes,

UNIT IV

Convolutional Codes: Introduction to Convolutional Codes, Tree Codes and Trellis Codes, Polynomial Description of Convolutional Codes (Analytical Representation), Notions for Convolutional Codes, The Generating Function, Matrix Description of Convolutional Codes, Veterbi Decoding of Convolutional Codes, Distance Bounds for Convolutional Codes, Performance Bounds, Known Good Convolutional Codes, Turbo Codes, Turbo Decoding 792.14 C, Concluding Remarks 788.15 Po

UNIT V

Trellis Codes Modulation: Introduction to TCM, The concept of Coded Modulation, Mapping by Set Partitioning, Ungerboeck's TCM Design Rules, TCM Decoder, Performance Evaluation for AWGN Channel, Computation of dfree, TCM for Fading Channel

Text Books:

1. Bose, Ranjan / "Information Theory, Coding & Cryptography" / Tata McGraw Hill /

Reference Books:

1. Van Lint, J.H./ "Introduction to Coding Theory" / Springer
2. Proakis, John G. / "Digital Communications" / McGraw Hill
3. Sathyanarayana, P.S. / "Probability Information and Coding Theory"/ Dynaram Publications, Bangalore
4. Gallager / "Information Theory and Reliable Communication"
5. Shulin & Costello/ "Error Correcting Codes" / Prentice Hall (India).
6. Taub & Schilling / "Principles of Communication Systems" / Tata McGraw Hill

Course Code: ECE – S508 Breakup: 3 1 0 4

Course Name : Satellite Communication And Radar

Course Details:

Unit-I

Introduction and Orbital Aspects:
Origin and Brief History,Orbital mechanics, Equation of Orbit, Location of Satellite in Orbit, Orbital Elements, Look Angle Determination, Elevation and Azimuthal Calculation, Orbital Perturbations, Geostationary Orbit, Launching Techniques.

Unit-II

Space Craft:
Introduction to Space craft Subsystems, Attitude and orbit control systems, Telemetry, Tracking and Command,Power Systems, Transponders, Space Craft Antennas.

Satellite link design: Basic transmission theory, system noise temperature and G/T ratio,Noise Figure and Noise Temperature, downlink & uplink system.

Unit-III

Modulation and multiple access techniques for satellite links:
S/N ratios for FM video transmission, digital transmission, digital modulation and demodulation, TDM.
FDM/FM/FDMA, TDMA, DAMA and CDMA, Random Access.
DBS:Introduction to analog DBS & Digital DBS.

Unit-IV

Radar Systems:
Basic Principles, Radar equation, Radar Performance Factors, Basic Pulsed Radar System, Radar Antenna and Scanning, Moving Target Indication,
Overview o INSAT system & Intelsat system.

Textbooks:

1. Satellite Communications / Pratt, Bostian, Allnutt / John Wiley & Sons.
2. Satellite Communications / Dennis Roddy / McGraw-Hill
3. Digital Satellite Communications/ Tri T. Ha./ McGraw-Hill.
4. Electronics Communication systems/G.Kennedy./McGraw-Hill

Course Code: ECE – S509 Breakup: 3 1 0 4

Course Name : Digital Image Processing

Course Details:

Unit I

Digitized Image & Its Properties: Basic Concepts, Image Digitization, Digital Image Properties
Data Structure for Image Analysis: Label of Image Data Representation, Traditional Image Data Structures, Hierarchical Data Structures

Unit II

Image Processing: Pixel Brightness, Transformation, Geometric Transformation, Local Preprocessing, Image Restoration
Segmentation: Thresholding, Edge Based Segmentation, Region Based Segmentation, Matching
Shape Representation: Region Identification, Contour Base Representation, Region Based Shape Representation, Shape Classes

Unit III

Image Transforms: Two Dimensional Orthogonal and Unitary Transforms, Properties of Unitary Transforms, Two Dimensional DFT, Cosine Transforms, Sine Transforms, Hudmard Transforms, KK Transforms, SVD Transforms
Image Enhancement: Point Operation, Histogram Modeling, Transform Operation

Unit IV

Image Data Compression: Image Data Properties, Discrete Image Transforms in Image Data Compression, Predictive Compression Methods, Vector Quantization, Hierarchical and Progressive Compression Methods, Comparison of Compression Methods, Coding, JPEG and MPEG Image Compression.

Unit V

3-D Vision, Geometry and Radiometry: 3-D Vision Tasks, Geometry For 3-D Vision, Radiometry and 3-D Vision, 3-D Model Based Vision, 2-D Based Representation of a 3-D Scheme.

Text Books:

1. Milan Sonya, Vaclav Hlavac & Roger Boyle / "Image Processing Analysis And Machine Vision"/ Vikas Publishing House
2. A.K. Jain / "Digital Image Processing" / Pearson Education

Reference Books:

1. Chanda, B. & Majumder, D. D. / "Digital Image Processing & Analysis" / Prentice Hall (India)

Course Code: ECE – S510 Breakup: 3 1 0 4

Course Name : Artificial Neural Network

Course Details:

Unit I

Fundamentals: Basic of neural science and artificial neural models ,graph algorithm, interconnection and routing, placement and partitioning/parallel/computation/associative memory

Unit II&III

Networks :perception ,multilayer network, training feed forward networks, unsupervised and reinforcement learning, adaptive structure network, unsupervised competitive learning adaptive resonant network, hybrid learning, radial basis function network(RBF) and time delay network (TDNNs)

Unit IV

Fuzzy neural Networks: Fuzzy set an logic, ANN implementation.

Application: hardware and implementation concern, approach to solving hard problems, multi-target tracking, time service prediction, hard written digit recognition, image compression , visual process network.

Textbooks:

1. N.K.Bose & P.Liang/Neural Network fundamental with graph, algorithm and application/TMH
2. Limin Fee/ Neural Network in compute Intelligence/TMH
3. Kosko/Neyral Network and fzzy System: A Dynamical system approach to machine intelligence/PHI
4. Robert Schalkogs/Artificial Neural /TMH

Course Code: ECE – S511 Breakup: 3 1 0 4

Course Name : Biomedical Instruments

Course Details:

Unit I

Introduction: The age of Biomedical Engineering, Development of Biomedical Instrumentation, Man–Instrumentation system, Components, Physiological system of the body, Problem encountered in measuring a living system.

Transducers & Electrodes: The Transducers & Transduction principles, Active transducers, Passive Transducers, Transducer for Biomedical Applications.

Unit II

Sources of Bioelectric potentials: Resting & Action potentials, propagation of active potential, The Bioelectric potentials-ECG, EEG, EMG, and Invoked responses

Electrodes: Electrode theory, Biopotential Electrodes–Microelectrodes Body surface electrodes, Needle Electrodes, Biochemical Transducers, Reference electrodes, PH electrodes, Blood Gas electrodes.

Unit III

Cardiovascular Measurements: Electrocardiography – ECG amplifiers, Electrodes & leads, ECG recorders - Three channel, Vector Cardiographs, ECG system for stress testing, Continuous ECG recording (Holter recording), Blood pressure measurement, Blood flow measurement, Heart sound measurements.

Patient Care & Monitoring- Elements of Intensive Care monitoring, patient monitoring displays, Diagnosis, Calibration & Repairability of patient monitoring equipment, pacemakers & Defibrillators.

Unit IV

Measurements in Respiratory system: Physiology of respiratory system Measurement of breathing mechanics- Spiro meter, Respiratory Therapy equipments: Inhalators ventilators & Respirators, Humidifiers, Nebulizers & Aspirators.

Diagnostic Techniques: Ultrasonic Diagnosis Echocardiography, Echo Encephalography, Ophthalmic scans, X-Ray & Radio-isotope Instrumentation, Computerized Axial Tomography Scanners

Unit V

Bio Telemetry: The components of Biotelemetry system Implantable units, Telemetry for ECG measurements during exercise, for Emergency patient monitoring. Physiological Effects of Electric Current Safety of Medical Electronic Equipments, Shock hazards from Electrical equipment and prevention against them.

Text Books:

1. Cormwell / "Biomedical Instrumentation and Measurements"/ Prentice Hall (India).

Reference Books:

1. Khandpur R.S./ "Biomedical Instrumentation"/ Tata McGraw-Hill.
2. Tompkins / "Biomedical DSP: C Language Examples and Laboratory Experiments for the IBM PC"/ Prentice Hall (India).

Course Code: ECE – S512 Breakup: 3 1 0 4

Course Name : Advanced Microprocessor

Course Details:

Unit-I

Progress from 80286 to 80486

Salient Features of 80386DX, Architecture and signal Description of 80386, Register Organization of 80386, Addressing Modes, Data Types of 80386, Real Address Mode of 80386, Protected Mode of 80386, Segmentation, Paging, Virtual 8086 Mode, Enhanced Instruction set of 80386, The co-processor 80387.

Unit-II

Pipelining & Cache

Introduction, The major hurdles of Pipelining-Pipelining Hazards, How is Pipelining implemented, Extending to the MIPS Pipeline to Hardle Multi Cycle Operation, MIPS R4000 Pipeline, MIPS R4300 Pipeline, Cross cutting Issues.

Introduction, Review of the ABC of Cache, Cache Performance, Reducing Cache Miss Penalty, Reducing Miss Rate, Reducing Cache Miss Penalty, Reducing Miss Rate, Reducing Cache Miss Penalty or Miss Rate by Parallelism, Reducing Hit Time.

Unit-III

An Introduction to the Pentium Microprocessor

Introduction, Real mode and Practical Mode Operation, The Software model of the Pentium, A Functional Description of the Pentium, Pentium Processor Registers, Pentium Data organization, Pentium Instruction Types, Pentium Addressing Modes, Interrupts.

Pentium Instruction [Part-1]

Introduction, Assembly language Programming, The Processor Flags, Data Transfer Instructions, String Instruction.

Pentium Instruction [Part-2]

Introduction, Arithmetic Instructions, Logical instructions, bit-manipulation instructions, program transfer and control instructions, process control instructions.

How an assembler generates Machine Codes, The beauty of Relocatable Code.

Interrupt Processing: Introduction, Hardware and Software Interrupts, The Interrupt vector table, The Interrupt Processing Sequence, Multiple Interrupts, Special interrupts, Interrupt Service Routine.

Unit-IV

Multicore processor

Architecture and application ,RISC architecture,CISC architecture,ARM architecture and application

Unit-V

An Introduction to Microcontroller 8051

Intel Family of 8bit Microcontroller, Architecture of 8051, Signal Description of 8051, Register set, Important operational features of 8051, Memory and I/O Addressing, Interrupts, Instruction set.

Textbooks:

1. A.K Ray, Bhurchandi-" Advanced Microprocessors and Peripherals".
2. Antonakos-"The Pentium Microprocessor".
3. John Hennessy & David Patterson-"Computer architecture-A Quantitative Approach".
4. DV Hall-" Microprocessor Interfacing".
5. Brey, Barry B-" INTEL Microprocessor".
6. Liu and Gibson G.A.-"Microcomputer Systems:the 8086/8088 Family".

Course Code: ECE – S513 Breakup: 3 1 0 4

Course Name : Radar & Navigation

Course Details:

Unit1
Nature of Radar
Radar block diagram & operation, Radar range performance & its equations, Minimum detectable signal, Cross-section of a target, PRF & Range ambiguity, Antenna parameters

Unit2
MTI & Doppler radar
Doppler effect, CW radar, FM CW, Delay line cancellers, Multiple or staggered, PRF, Non coherent MTI, Pulse Doppler Radar

Unit3
Scanning, Duplexers and Radar receivers
Sequential lobing, Conical Scanning, Monopulse Tracking RADAR, Tracking with surveillance RADAR, Acquisition, Radar receiver, Display Duplexers

Unit4
Electronic Navigation
Introduction, loop antenna, loop i/p ckts, Aural null detection finder, Goniometer, Adcock detection finder, VHF omni-directional range finder, The LF/MF four course radio range

Unit5
Navigation Systems and Clutter
VOR receiving equipment, Loran-A, DECCA navigation system, DME, TACAN, Surface clutters Radar equation, Sea clutter, Land clutter

Text Book:

1. Skolnik M. I. / "Introduction to Radar Systems"/ McGraw-Hill
2. Nagraja, N.S. / "Elements of Electronic Navigation"/ Tata McGraw Hill / 2nd Ed.

Reference Book:

1. Nathanson, Fred E. / "Radar An Overview Design Principles"/ Prentice–Hall (India)
2. Toomay, J.C. / "Principles of Radar"/ Prentice–Hall (India)