AC-1101 APPLIED CHEMISTRY

L T P — Sessional Marks:25

3 1 0 — End Term Exam Marks:75

PART-A

1. Structure of an Atom **(6 hrs.)**

Recapitulation of fundamental particles of atom (e,p,n), e = electron; P=proton, ; n=neutron,Bohr's model of atom, Line spectrum of hydrogen,,Modern concept of atom-four quantum numbers, shells, sub shells orbitals (shapes of s and p orbitals), Pauli's exclusion principle, Aufbau Energy ranking rule, Hund's rule, Modern periodic table, periodic properties (ionization potential, electron affinity, atomic and ionic radii)

2. Chemical Bonding **(6 hrs.)**

Types of chemical bond (ionic, covalent, cooordinate), Lewis structure, VSEPR theory, Oribital concept of co-valency, formation of s-s, s-p, and p-p bonding with examples, Hybridization sp, sp^2, sp^3 (consider BeF_2, BF_3, CH_4 molecules and other simple molecules), Intermolecular forces (Vanderwaal forces, Hydrogen bond), Metallic bond

PART-B

3. Atoms molecules & Chemical Arthimetic **(4 hrs.)**

Atomic no., Mass no., Mole concept, Empirical formula, Molecular formula

4. Oxidation and Reduction **(6hrs)**

Electronic concept of oxidation and reduction, Redox reactions (direct and indirect), Balancing of simple redox reactions (oxidation number method and ion electron method)

PART-C

5. Chemical Equilibrium

(6 hrs.)

Law of Chemical equilibrium, Le chatelier principle, Ionziation, factors affecting ionization of water, Ionic product, pH concept, Common Ion effect and solubility product, Concept of acids and bases, Acid Base equilibira, Buffer solutions

6. Electro chemistry

(04 hrs)

Conductance (specific, molecular and equivalent conductance), Electrolysis, Faraday's law and its application, Electro-chemical cell, electrode potential, emf, electrochemical series and its applications.

PART-D

7. Organic Chemistry

(10 hrs.)

Classsification, nomenclature of organic compounds, Preparation and properties of alkanes, alkenes, alkyne and benzene

Books Recommended

1. Chemistry for class XI and XII, published by NCERT

AC-1102 APPLIED CHEMISTRY

L T P | Sessional Marks:25
2 1 0 | End Term Exam Marks:50

PART-A

1. Atoms molecules & chemical Arthimetic (4 hrs.)

Atomic no., Mass no., Mole concept, Empirical formula, Molecular formula

2. Structure of an Atom (5 hrs.)

Recapitulation of fundamental particles of atom (e,p,n), e = electron; P=proton, ; n=neutron,Bohr's model of atom, Line spectrum of hydrogen,,Modern concept of atom-four quantum numbers, shells, sub shells orbitals (shapes of s and p orbitals), Pauli's exclusion principle, Aufbau Energy ranking rule, Hund's rule, Modern periodic table, periodic properties (ionization potential, electron affinity, atomic and ionic radii)

PART-B

3. Chemical Bonding (6 hrs.)

Types of chemical bond (ionic, covalent, cooordinate), Lewis structure, VSEPR theory, Oribital concept of co-valency, formation of s-s, s-p, and p-p bonding with examples, Hybridization sp, sp^2, sp^3 (consider BeF_2, BF_3, CH_4 molecules and other simple molecules), Intermolecular forces (Vanderwaal forces, Hydrogen bond), Metallic bond

PART-C

4. Chemical Equilibrium

(4 hrs.)

Law of Chemical equilibrium, Le chatelier principle, Ionziation, factors affecting ionization of water, Ionic product, pH concept, Common Ion effect and solubility product, Concept of acids and bases, Acid Base equilibira, Buffer solutions

PART-D

5. Organic Chemistry (10 hrs.)

Classsification, nomenclature of organic compounds, Preparation and properties of alkanes, alkenes, alkyne and benzene

Books Recommended

1. Chemistry for class XI and XII, published by NCERT

AC –1201/AC-1202 CHEMISTRY & ENVIRONMENT – II

L T P Sessional Marks:25

2 1 0 End Term Exam Marks:50

RATIONALE:

Applied chemistry has been considered as one of the core subjects for certificate holder to develop in them understanding of concepts and principles of chemistry and understanding of chemical properties of materials, electrochemistry, organic chemistry and environmental chemistry. This is a foundation course to develop scientific temper and development of continued learning skills in the students.

DETAILED CONTENTS

PART-A

1. ORGANIC CHEMISTRY – Some Basic Principles:
(10 Hours)

Electronic displacement in a covalent bond; inductive effect, electronic effect, resonance and hyperconjugation. Fission of a covalent bond; free radicals, electrophiles, nucleophiles, carbocations and carbanions. Common types of organic reactions: Addition , substituttion (SN1, SN2), Elimination (E1,E2) and rearrangement reactions .

Stereoisomerism: Optical and geometrical isomerism, chirality, DL and RS notation. Conformation in cyclohexane, mono and di-substituted cyclohexane (chair and boat form).

PART-B

2. ELECTROCHEMICAL CELL AND CORROSION:
(5 Hours)

Electrochemical cell, type of electrodes, electrode potential and EMF, effect of concentration of cell potential (Nernst equation), relationship of the cell potential and the equilibrium constant. Corrosion, types of corrosion, mechanism of electrochemical corrosion, corrosion protection.

PART-C

3. CHEMICAL KINETICS
(5 Hours):

Molecularity, rate and order of reaction, factors influencing rates of reaction, activation energy, rate equation for first and second order reaction, pseudo-unimolecular reactions.

4. CHEMICAL ENERGETICS: (5 Hours)

Energy changes in chemical reactions, enthalpy changes.Heats of reactions and thermochemistry, Hess's law of constant heat summation, elementary idea about entropy, free energy changes and chemical reactions.

PART-D

5. ENVIORNMENTAL CHEMISTRY:

(7 Hours)

Environmental pollutants; soil, water and air pollution; chemical reactions in atmosphere, kind of smog, major atmospheric pollutants; acid rain, ozone and its reactions, effects of the depletion of ozone layer, green house effect and global warming – industrial air pollution, green chemistry as an alternative tool for reducing pollution.

Books Recommended

1. Chemistry for class XI and XII, published by NCERT

AM-1101 APPLIED MATHEMATICS-I

L T P Sessional Marks:50

3 2 0 End Term Exam Marks:75

UNIT-I

Introduction to trigonometric formulas. Trigonometric ratios of multiple and sub-multiple angles (2A, 3A, A/2). Product formulae, conversion from sum or difference to product and vice-versa (without proof). Solutions of simple trigonometric equations. Inverse trigonometric functions and their properties. Permutation and combinations, elementary problems. Principle of mathematical Induction. (14 Hrs)

UNIT-II

Binomial theorem for positive integral index (without proof) and for any index (without proof), general and particular terms, first and second binomial approximation, simple problems. Complex number in the form of a+ib, Argand diagram, polar form, algebra of complex numbers, modulus and argument of a complex number, square root of a complex number, cube root of unity, triangle inequality, De-Moivre's theorem (without proof) and simple problems. (16 Hrs)

UNIT-III

Review of distance formula and section formula, equation of straight line in various standard forms, intersection of two straight lines, angle between two lines, condition of parallelism and perpendicularity, perpendicular distance formula. General equation of a circle, diameter form, centre and radius of a circle, circle through three non-collinear points, tangent and normal to a circle at a given point on it, condition of tangency. (13 Hrs)

UNIT-IV

Introduction to conic section, standard equation of parabola, ellipse and hyperbola (without proof), writing equations when directrix, focus and eccentricity are given; finding focus, directrix, latus-rectum, axes, eccentricity and vertex when equation is given. Arithmetic progression, geometric progression, arithmetico-geometric series. Special series: $\sum n$, $\sum n^2$, $\sum n^3$. (13 hrs)

RECOMMENDED BOOKS

Text Book

Text books on Mathematics for XI, NCERT, New Delhi

Reference Books

Shanti Narayan, Coordinate Geometry, S. Chand and Co.
Thomas & Finney, Calculus, Pearson Education

AM-1201 APPLIED MATHEMATICS-II

L T P
3 2 0

Sessional Marks:50
End Term Exam Marks:75

UNIT-I

Function, types of functions, domain and range. Concept of limit. Standard limits. Continuity of a function (with simple examples). Physical & geometrical meaning of $\frac{dy}{dx}$, differentiation of x^n, sin x, cos x, tan x, e^x ,a^x and log x from the first principle. Differentiation of sum, difference, product and quotient. (14 hrs.)

UNIT-II

Differentiation of function of a function. Chain rule of differentiation, differentiation of inverse trigonometric functions, logarithmic and parametric differentiation. differentiation of implicit function. Maxima and minima of a function. Equations of tangent and normal (for explicit function only). (14 hrs)

UNIT-III

Integration as an anti-derivative, fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution, by parts and by partial fractions. Integration of rational and irrational functions.

(14 hrs)

UNIT-IV

Evaluation of definite integral by substitution, properties of definite integral (without proof). Application of definite integral in finding area under a curve and area between two Curves involving line, circle, parabola and ellipse only.

(14 hrs)

RECOMMENDED BOOKS:

Text Book

Text books on Mathematics for XII, NCERT, New Delhi

Reference Books

Shanti Narayan, Differential Calculus, S.Chand & Co.
Shanti Narayan, Integral Calculus, S.Chand & Co.

AP-1101 APPLIED PHYSICS–I

L T P **Sessional Marks:25**
3 1 0 **End Term Exam Marks:75**

UNIT-I

UNITS AND MEASUREMENTS: Need for measurements, system of units, S.I. units, fundamental and derived units. Dimensional formula, dimensional equations and their applications. Error in Physical measurements-causes & types. Combination of errors(qualitative ideas). Numerical Problems (4hrs)

VECTOR ANALYSIS: Scalars and vectors, vectors in two and three dimensions, unit vector, laws of vector addition, Resolution of a vector in a plane, rectangular components, scalar and vector products. Numerical Problems (6hrs)

UNIT-II

DESCRIPTION OF MOTION: Motion in a straight line, uniform motion, speed and velocity, equations of motion, instantaneous velocity and acceleration. Motion in two dimensions, projectile motion, uniform circular motion, qualitative concepts of torque, angular momentum, conservation of angular momentum, centripetal and centrifugal forces. Numerical Problems (6 hrs)

LAWS OF MOTION:
Force and inertia, first law of motion, momentum, second law of motion, impulse, third law of motion, conservation of linear momentum, qualitative concepts of rocket propulsion. Friction and its cause, Static and kinetic friction, self-adjusting nature of friction, laws of limiting friction, rolling friction, angle of friction and angle of repose, methods to reduce friction. Numerical Problems (6hrs)

UNIT-III

WORK, POWER AND ENERGY: Work and its scalar representation, Work done by a constant force, kinetic and potential energy, conservation of energy (free fall motion of a body), Power. Numerical Problems (6 hrs)

GRAVITATION:
Universal law of gravitation, Inertial and gravitational mass, relation between ‘g’ and ‘G’, variation of acceleration due to gravity (with altitude and depth), orbital velocity, escape velocity, elementary ideas of geo-stationary satellite. Numerical Problems (4 hrs)

UNIT-IV

SIMPLE HARMONIC MOTION: Periodic motion, simple harmonic motion (S.H.M.) K.E. and P.E. in S.H.M., simple pendulum and oscillations of mass attached to vertical spring. Concepts of seconds pendulum, Wave motion, its kinds & properties,

speed, frequency, amplitude, time period and displacement of wave, principle of superposition. Numerical Problems (4 hrs)

Properties Of Matter:

Interatomic and intermolecular forces, elastic properties, Hooke's law, Three moduli of elasticity, Poisson's ration, surface tension and surface energy, angle of contact, examples of drops and bubbles, capillary rise, Viscosity, Stoke's law (treatment by dimensional analysis), Streamline and turbulent flow, Bernoulli's theorem. Numerical Problems (6 hrs)

Recommended Books:

1. Fundamental Physics Class (XI) by K L Gomber & K L Gogia Pardeep Publicatios
2. Fundamental of Physics by Haliday & Resnick and Walker John Wiley & Sons

AP-1102 APPLIED PHYSICS-I

L T P **Sessional Marks : 25**
2 1 0 **End Term Examination Marks: 50**

UNIT – I

UNITS AND MEASUREMENTS: Need for measurements, system of units, S.I. units, fundamental and derived units. Dimensional formula, dimensional equations and their applications. Error in Physical measurements-causes & types. Combination of errors (qualitative ideas). Numerical Problems (4hrs)

VECTOR ANALYSIS: Scalars and vectors, vectors in two and three dimensions, unit vector, laws of vector addition, Resolution of a vector in a plane, rectangular components, scalar and vector products, Numerical Problems. (4hrs)

UNIT – II

DESCRIPTION OF MOTION: Motion in a straight line, uniform motion, speed and velocity, equations of motion, instantaneous velocity and acceleration. Motion in two dimensions, uniform circular motion, qualitative concepts of torque, angular momentum, conservation of angular momentum, centripetal and centrifugal forces. Numerical Problems (6 hrs)

UNIT –III

LAWS OF MOTION: Force and inertia, first law of motion, momentum, second law of motion, impulse, third law of motion, conservation of linear momentum, qualitative concepts of rocket propulsion. Friction and its cause, Static and kinetic friction, self-adjusting nature of friction, laws of limiting friction, methods to reduce friction. Number of Problems (4 hrs)

WORK, POWER AND ENERGY: Work and its scalar representation, Work done by a constant force, kinetic and potential energy, Power. Numerical Problems (4 hrs)

UNIT –IV

PROPERTIES OF MATTER: Interatomic and intermolecular forces, elastic properties, Hooke's law, Three Moduli of elasticity, Poisson's ratio, surface tension and surface energy, angle of contact, examples of drops and bubbles, capillary rise, Viscosity, Stoke's law (treatment by dimensional analysis), Streamline and turbulent flow, Bernoulli's theorem. Numerical Problems (6 hrs)

Recommended Books:

1. Fundamental Physics Class (XI) by K L Gomber & K L Gogia Pardeep Publicatios
2. Fundamental of Physics by Haliday & Resnick and Walker John Wiley & Sons

AP-1201 APPLIED PHYSICS-II

L T P
3 1 0

Sessional Marks : 25
End Term Examination Marks: 75

UNIT- I

ELECTROSTATICS: Coulomb's law (scalar & vector forms), electric field, electric field due to a point charge, electric dipole and its moment, electric fields along the axial and equatorial lines, concept of dielectric and dielectric constant, Gauss's theorem and its application to find electric field due to an infinitive wire and plane sheet of charge. Conductors and insulators, force and torque experienced by a dipole (in uniform electric field), capacitance, parallel plate capacitor with air/dielectric medium between the plates, series and parallel combinations of capacitors, energy of a capacitor. Numerical Problems (6 hrs)

CURRENT ELECTRICITY

Electric current, Ohm's law, resistance, resistively, combination of resistances in series and parallel, internal resistance of a cell and its E.M.F, Kirchhoff's laws, principle of potentiometer and its application for comparing e.m.f. of two cells and determination of internal resistance of a cell. Numerical Problems (4 hrs)

UNIT- II

MAGNETISM: Magnetism and its origin, Magnetic lines of force and magnetic dipole, current loop as a magnetic dipole, earth's magnetic field and its source (elementary ideas), concepts and properties of Para, Dia and Ferro-magnetic substances with examples. Numerical Problems (4 hrs)

THERMAL AND MAGNETIC EFFECTS OF CURRENT: Electric energy and power, Joule's law of heating, thermoelectricity (Seeback effect), Biot-Savart's law, magnetic field due to a straight wire and a circular loop. Force on a moving charge in a uniform magnetic field, force between two parallel current carrying conductors, definition of Ampere, elementary idea of moving coil galvanometer and its conversation into ammeter and voltmeter. Numerical Problems (6 hrs)

UNIT- III

ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT: Electromagnetic induction, Faraday's law, Induced e.m.f., Lenz's law, Lorentz magnetic force, self and mutual inductance, alternating current & e.m.f., mean and rms value of AC, elementary idea of working of transformer. Numerical Problems. (6 hrs)

HEAT AND THERMODYNAMICS: First law of thermodynamics, specific heat at constant volume and constant pressure of ideal gas, relation between Cp and Cv. Thermodynamic processes (reversible, irreversible, isothermal and adiabatic),

second law of thermodynamics. Thermal conductivity, black body radiation, Wien's law, Stefan's law, Newton's law of cooling. Numerical Problems (6 hrs)

UNIT- IV

RAY OPTICS AND OPTICAL INSTRUMENTS: Laws of reflection and refraction, refractive index, lens and curved mirrors, lens and curved mirror formula, linear magnification, dispersion of light by prism and dispersive power (qualitative ideas), total internal reflection and its application in optical communication (elementary ideas), Prism Spectrometer, Optical instruments- simple microscope, Galilean telescope and magnifying power. Numerical Problems (6 hrs)

WAVE OPTICS : Wave front and Huygen's principle, interference of light, Young's double slit experiment, coherent sources of light, diffraction of light, diffraction due to a single slit, polarization of light (general idea). Numerical Problems (4 hrs)

RECOMMENDED BOOKS:

1. Fundamental Physics Class (XII) by K L Gomber & K L Gogia Pardeep Publicatios
2. Fundamental of Physics by Haliday & Resnick and Walker John Wiley & Sons

AP-1202 APPLIED PHYSICS-II

L T P
2 1 0

Sessional Marks: 25
End Term Examination Marks: 50

UNIT- I

ELECTROSTATICS: Coulomb's law (scalar & vector forms), electric field, electric field due to a point charge, electric dipole and its moment, electric fields along the axial and equatorial lines, concept of dielectric and dielectric constant, Gauss's theorem and its application to find electric field due to an infinitive wire and plane sheet of charge. Conductors and insulators, capacitance, parallel plate capacitor with air/dielectric medium between the plates, series and parallel combinations of capacitors, energy of a capacitor. Numerical Problems

(8 hrs)

UNIT-II

CURRENT ELECTRICITY: Electric current, Ohm's law, resistance, resistively, combination of resistances in series and parallel, internal resistance of a cell and its E.M.F, Kirchhoff's laws, principle of potentiometer and its application for comparing e.m.f. of two cells and determination of internal resistance of a cell. Numerical Problems

(4 hrs)

MAGNETISM: Magnetism and its origin, Magnetic lines of force and magnetic dipole, current loop as a magnetic dipole, concepts and properties of Para, Dia and Ferro-magnetic substances with examples. Numerical Problems (4 hrs)

UNIT- III

THERMAL AND MAGNETIC EFFECTS OF CURRENT: Electric energy and power, Joule's law of heating, Elementary ideas of thermoelectricity (Seeback effect), Biot-Savart's law, magnetic field due to a straight wire and a circular loop. Force on a moving charge in a uniform magnetic field, force between two parallel current carrying conductors, definition of Ampere. Numerical Problems (4hrs)

HEAT AND THERMODYNAMICS:

First law of thermodynamics, specific heat at constant volume and constant pressure of ideal gas, relation between Cp and Cv. Thermodynamic processes (reversible, irreversible, isothermal and adiabatic), second law of thermodynamics, Transfer of heat, Conduction, Thermal conductivity and Searle's method, Convection & Radiation. Numerical Problems (4 hrs)

UNIT- IV

RAY OPTICS AND OPTICAL INSTRUMENTS: Laws of reflection and refraction, refractive index, lens and curved mirrors, lens and curved mirror formula, linear magnification, dispersion of light by prism and dispersive power (qualitative ideas), total internal reflection and its application in optical communication (elementary ideas), Optical instruments- simple microscope, Prism Spectrometer. Numerical Problems (6 hrs)

Recommended Books:

1. Fundamental Physics Class (XII) by K L Gomber & K L Gogia Pardeep Publicatios
2. Fundamental of Physics by Haliday & Resnick and Walker John Wiley & Sons

CH-1101 INTRODUCTION TO PAPER & PRINTING TECHNOLOGY

L T P **Sessional Marks:25**
2 1 0 **End Term Exam Marks:50**

Unit-I

Introduction : History and scope: Raw Material: Introduction to paper as network of cellulosic fibers. Brief study of fibrous raw materials; their classification, their sources and availability in the context of Indian paper industry.

(07 Hrs)

Unit-II

Process Overview: A brief overview of the process of paper making. General introduction to the processes of raw material handling, pulping bleaching, stock preparation, wet end operations and dry end operations. Introduction to chemical recovery.

(08 Hrs)

Unit-III

Paper as End product: Introduction to different grades of paper. Industrial and cultural grades; packaging grades of paper, writing and printing grades.

(07 Hrs)

Unit-IV

Introduction of Printing Process: Different types of printing machines, different raw materials of printing and their significance.

(08 Hrs)

Recommended Books:

Text Books:

Handbook of Pulp and Paper Technologists by G.A. Smook

Reference Books:

Handbook of Paper Technology by K.W. Britt
Handbook of Paper Technology by C. Biermann
Paper Manufacturing Vol. I and II by R.G. Mcdonald

CH-1102 BASIC CALCULATIONS IN PROCESS INDUSTRY

L T P **Sessional Marks:25**
2 1 0 **End Term Exam Marks:50**

Unit-I

Introduction:Units: CGS and SI units, conversion of units, units in use for flow, pressure, temperature, humidity, density, viscosity, surface tension, heat, consistency.

(08 Hrs)

Unit-II

Material Balance: Concept of mole, Kg mole, molarity, molality, normality, gm per litre, ppm with simple material balance problems. Basic idea of by pass, purge, recycle, blow-off, blow down (without numerical problems).

(07 Hrs)

Unit-III

Energy Balance: Concept of calorie, calorific value, specific heat, heat of reaction, heat of formation, heat of dissolution, heat of solution.

(07 Hrs)

Unit-IV

Endothermic and exothermic reactions, latent heat sensible heat, simple numerical problems involving $mc \Delta T$.
Note: Emphasis will be on applications in Pulp & Paper Industries.

(08 Hrs)

Recommended Books:

Text Books
Calculations in Chemical Engineering by Himmeblau

Reference Books:
Chemical Process Principles by Hougon and Watson
Stoichiometry by Bhatt and Vohra
Industrial Stoichiometry by Lewis and Lewis

CH-1202 UNIT OPERATIONS-I

L T P
2 1 0

Sessional Marks:25
End Term Exam Marks:50

Unit-I

Size Reduction: Working of Ball Mill, Jaw Crusher and Blake crusher. Size Separation: Working of screens, centrifuge.

(08 Hrs)

Unit-II

Solids Handling and Transportation: Working of belt conveyor, screw conveyor and elevators. Storage of solids.

(07 Hrs)

Unit-III

Mixing and Agitation: Working of mixer for thick slurries, kneaders and agitators.

(07 Hrs)

Unit-IV

Clarification: Working of clarifier and its industrial uses. Filtration: Working of filter press, notch filter, vacuum filter and their industrial uses.

(08 Hrs)

RECOMMENDED BOOKS:

TEXT BOOKS:

Unit Operations of Chemical Engineering by McCabe and Smith, McGraw Hill Publications.

REFERENCE BOOKS:

Chemical Engineering Vol. I & II by Conlson and Richardson, Pergamon Press Publications.
Introduction to Chemical Technology by Badger and Banchero, McGraw Hill Publications.
Fluuid Mechanics and its Applications by Gupta and Gupta, Wiley Eastern Publications.
Principles of Unit Operations by Foust, John Wiley Publications.

CH- 2101 UNIT OPERATIONS-II

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit-I

Heat Transfer: Basic idea of conduction, convection and radiation; thermal resistance, thermal conductivity of materials, selection of insulation materials.

(06 Hrs)

Unit-II

Heat Exchangers: Various types of heat exchangers such as double pipe heat exchangers such as double pipe heat exchanger, shell and tube heat exchanger, plate type heat exchanger, fin type heat exchanger.

(08 Hrs)

Unit-III

Evaporators: Different types of evaporators, working of single and multiple effect evaporator, different feeding arrangements. Drying: Working of single and double drum dryer.

(08 Hrs)

Unit-IV

Distillation: Basic concept of distillation of binary mixtures. Cooling Towers and Spray Ponds: Basic idea of working of cooling towers and spray ponds.

(08 Hrs)

RECOMMENDED BOOKS:

Unit Operations of Chemical Engineering by McCabe and Smith; McGraw Hill Publications.

REFERENCE BOOKS:

Chemical Engineering Vol. I & II by Coulson and Richardson; Pergamon Press Publications.
Introduction to Chemical Technology by Badger and Banchero; McGraw Hill Publications.
Fluid Mechanics and its Applications by Gupta and Gupta; Wiley Eastern Publications.
Principles of Unit Operations by Foust; John Wiley Publications.

CH- 2102 FLUID HANDLING AND TRANSPORTATION

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit-I

Fluid Properties: Basic idea of physical properties of fluids and their behavior compressible and incompressible fluids (mathematical analysis excluded).

(07 Hrs)

Unit-II

Pipe and Fittings: Different types of pipes, idea of ID and OD of pipe, schedule number, different types of valves such as globe valve, gate valve, butterfly valve, ball valve, needle valve, non return valve, diaphragm valve, different types of fittings such as Tee, Bends, Elbow, Union, Plug, Collar etc.

(09 Hrs)

Unit-III

Pumps and Compressors: Working of centrifugal pump, rotary pump, gear pump, diaphragm pumps, vacuum pump, ejectors. Handling and distribution of gases, working of fans, blowers and compressors.

(08 Hrs)

Unit-IV

Steam Distribution: Handling and distribution of steam, operational aspects, safety consideration and steam, traps, expansion loops.

(06 Hrs)

Recommended Books:

Principles of Unit Operations by Foust, John Willey Publications.

REFERENCE BOOKS:

1. Unit Operations of Chemical Engineering by McCabe and Smith, McGraw Hill Publications.
2. Chemical Engineering Vol. I & II by Coulson and Richardson, Pergamon Press Publications.
3. Introduction to Chemical Engineering by Badger and Banchero, McGraw Hill Publications.
4. Unit Operations by Brown, John Willey Publications.

CH- 2103 PRINTING TECHNOLOGY –I

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit-I

Letter Assembly: A short history of printing, an introduction to typographic design, introduction to letter press printing machines, introduction to digital type setting, monotype, linotype. Letter assembly by hand composition, proofing, proof correction practices.

(08 Hrs)

Unit-II

Lithography: Lithography planning, registration system from film to plate and plate to machine, different types of lithographic plates, direct and indirect printing methods, ink and water balance in lithography.

(07 Hrs)

Unit-III

Flexo, Gravure, Screen Printing: Flexographic principles, materials and processes, gravure systems, gravure ink and their properties, screen printing materials and processes.

(07 Hrs)

Unit-IV

Material Testing: Standard tests, sampling technique, IGT printability testing, Dry print performance test, film printing tests.

(08 Hrs)

Recommended books:

Printing Technology by J.M. Adams & P.a. Dolin; Thompson Delmar

REFERENCE BOOKS:

1. Pulp & Paper Chemistry & Chemical Tech., VOl. 3 by J.P. Casey; Wiley
2. Offset Lithographic Technology by K.F. Hird; Goodheart-Wileox.
3. Flexography Primer by J.P. Crouch; Graphic Arts Technical Foundation.
4. Hand Book of Printing Technology of NIIR Board, National Institute of Industrial Research.

CH- 2104 PULPING AND BLEACHING TECHNOLOGY

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit-I

Introduction: Definition of pulping as a fiber separation process, Introduction to major constituents of lingo cellulosic raw materials. Different pulping processes like chemical pulping, mechanical pulping and semi-chemical pulping. Pulping of non-wood raw materials.

(07 Hrs)

Unit-II

Raw Material Preparation & Pulping Equipments: Brief study of debarking, chipping and chip screening, operating procedures and safeguards of chippers and chip screens. Pulping Equipments: Different types of digesters: rotary and stationary, spherical & cylindrical, direct and indirect heating.

(08 Hrs)

Unit-III

Alkamine Pulping: Description of soda and kraft pulping processes, digester room operations, ship filling, liquor charging, time of temperature, time at temperature, liquor circulation and maintenance of batch ratio, digester relief and blow, simple calculations on pulp yield and chemical \requirement. Introduction to continuous pulping of non-wood, continuous pulping on non-woody raw materials like bagasse and straws. Introduction to common semi-chemical puling processes, CMP and CTMP process, equipment used, their operations, maintenance and safeguards.

(08 Hrs)

Unit-IV

Bleaching of Pulp: Fundamentals of pulp bleaching, important bleaching agents; their advantages and disadvantages. Brightness as a measure of pulp bleaching. Development of flow sheet for important bleaching sequences with emphasis on operational measures and equipment used. Storage, handling and safety of chlorine and chlorine based bleaching agents, introduction to chlorine free bleaching.

(07 Hrs)

Recommended Books:

Handbook of Pulp and Paper Technologists by G.A. Smook

REFERENCE BOOKS:

1. Pulp & Paper Chemistry and Chemical Technology Vol. I, by J.P. Casey.
2. Pulping Processes by Rydholm
3. Textbook of Pulp and paper Making by Libbey
4. Handbook of Pulp and Paper Technologists by C Biermann
5. Bleaching of Pulp by R.P. Singh

CH- 2105 INSTRUMENTATION IN PAPER & PRINTING TECHNOLOGY

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit-I

Measurement of Industrial Parameters: Study of Industrial instruments and devices for measurement of industrial parameters like temperature, pressure, flow and level.

(08 Hrs)

Unit-II

Measurement devices: Working of pressure gauge/vacuum gauge, volumetric flow measurement, mass flow measurement, working of rotameter, ventur meter, Pitot Tube, V-Notch and square notch.

(08 Hrs)

Unit-III

Temperature measurement, Level Measurement, pH measurement on line.

(07 Hrs)

Unit-IV

Measurement devices in paper industry: On line consistency measurement and regulation. Online moisture, basis weight, brightness measurement.

(7 Hrs)

Recommended Books:

Industrial Instrumentation and Control by S.K. Singh

REFERENCE BOOKS:

1. Principles of Industrial Instrumentation by d. Patranabis.
2. Industrial Instrumentation by Eckman
3. Handbook for Pulp & Paper Technologists by G.A. Smook

CH- 2201 PULP WASHING & CHEMICAL RECOVERY

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit-I

Brown Stock Washing: Study of pulp washing on multistage rotary vacuum filters. Construction and working of a rotary vacuum filter. Operating procedures, including startup and shutdown. Generation and maintenance of vacuum. Concept of dilution factor and elementary calculations.

(08 Hrs)

Unit-II

Other Washing Equipments: Washing equipments other than rotary vacuum filters like horizontal belt washers and diffusion washers (only working principles and operational aspects). Black liquor as an asset rather than a liability, its importance as an energy source, overview of recovery process.

(08 Hrs)

Unit-III

Black liquor concentration & incineration: Introduction to multiple effect evaporations of Black liquor, Brief description of type of evaporators, condensate systems, vacuum devices, feeding arrangement. Operation of evaporators and operational troubles, Introduction to direct contact evaporators.

(07 Hrs)

Unit-IV

Causticizing: The causticizing reaction. Operation of slakers, causticizers, mud washers and mud filters.

(07 Hrs)

Recommended Books

Handbook of Pulp and Paper Technologists by G.A. Smook
Pulp and Paper Manufacture Vol. 5 by M.J. Mowrek

Reference Books:

Handbook of Pulp and Paper Technology by K.W. Britt
Handbook of Pulp and Paper Technology by C Biermann
Bleaching of Pulp by R.P. Singh

CH- 2202 STOCK PREPARATION AND PAPER MAKING

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit-I

Stock Preparation: Scope and importance of stock preparation, different processes during stock preparation, Introduction of mechanical treatment of pulp fibers, Equipment used for mechanical treatment. Concept of freeness and its measurement. Operating procedures for refiners and beaters. Different internal sizing agents, preparation and storage of sixe solution and alum, Brief study of wet end additives like starches, gums, dyes, fillers and strength improvement resins, retention aids, foaming and its control. Storage and agitation of paper making stock.

(10 Hrs)

Unit-II

Screening and Cleaning: Screening and cleaning systems for stock preparation and wet end of paper machine.

Approach Flow System: Various stock distribution systems. Operation and maintenance of open aid air cushion type roll head boxes. Introduction to hydraulic head boxes.

(07 Hrs)

Unit-III

Wet End Operations: Introduction to different Units of a Fourdrinier paper machine. Operating procedures and practices. Maintenance and troubleshooting. Brief study of drainage elements. Concept of basis weight and its control. Introduction to twin wire forming. Startup and shutdown procedures. Tackling a web break.

Sheet Pressing and Consolidation: Transfer of sheet from the wire Unit to the press Unit. Types of draws. Brief study of different types of presses and felts. Loading and unloading procedures. Web break events.

(07 Hrs)

Unit-IV

Paper Drying: Arrangement and operation of multicylinder dryer and yanki dryers. Dryer felts. Grouping of dryers. Working procedures for steam condensate removal systems. Startup and shutdown procedures.

Paper Finishing: Operation of calendars and pope reels. Working and maintenance of rewinders, cutters and guillotines.

(06 Hrs)

Recommended Books:

Handbook of Pulp and Paper Technologists by G.A. Smook

Reference Books:

Handbook of Pulp and Paper Technology by K.W. Britt
Handbook of Pulp and Paper Technology by C Biermann
Pulp and Paper: Chemistry and Chemical Tech., Vol. III By JP Casey

CH- 2203 PRINTING TECHNOLOGY-II

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit-I

Printing Machines: Description of working principles of flat-bed machines, sheet fed offset machines, sheet fed rotary machines, web machines, gravure and flexo machines, printing on surfaces other than papers.

(08 Hrs)

Unit-II

Ink Technology: Raw materials of printing inks, pigments and dyestuffs, oils, solvents, resin, plasticizers, driers, waxes, surfactants, etc.

(07 Hrs)

Unit-III

Nature of printing ink visual characteristics, drying characteristics adhesive nature, resistance properties.

(07 Hrs)

Unit-IV

Light sources: Perception of colors, additive and subtractive methods, color triangle, color standards. Optical properties of printing materials, color measurement theory, color matching.

(08 Hrs)

RECOMMENDED BOOKS:

Printing Technology by J.M. Adams & P.A. Dolin; Thomson Delmar

Reference Books:

Modern Technology of Printing & Writing Inks by NIIR Board, National Institute of Ind. Research.

Offset Lithographic Technology by K.F. Hird; Goodheart-Wileox.

Sheetfed Offset Press Operating by L.P. Dejidas & T.M. Destree; Graphic Arts Technical Foundation.

CS-1101 COMPUTER FUNDAMENTALS & INFORMATION TECHNOLOGY

L T P **Maximum Sessional Marks – 25**
2 0 0 **Maximum End Term Examination Marks – 25**

Unit - I

Block diagram of computer, CPU, memory, microprocessor, type of computer-PC, PC-XT, PC-AT, 286,386,486, PENTIUM-I, II, III, IV, mini computer, Main-frame computer concept of hardware and software, flowchart and algorithm, introduction to high level and low level languages, translators-assembler, compiler & interpreter. (08 Hrs)

Unit - II

Input and output devices : Keyboard, mouse VDU, printer
Memory : Type of memory, primary: RAM ROM and its types.

(08 Hrs)

Unit - III

Secondary storage devices, Introduction to data, Bits, Bytes, Bus system, binary and decimal number system and their inter-conversion.
Concept of networking, Need, types (LAN, WAN,MAN)- it is basics; introduction to topologies(MESH, RING, TREE, BUS,STAR).

(08 Hrs)

Unit – IV

Internet Basics : Introduction, history , dialup configuration and ISP, web browser world wide web (WWW), hypertext transfer protocol (HTTP) and file transfer protocol (FTP), URL, e-mail, chatting. (08 Hrs)

Recommended Books:

Title	**Publisher**	**Author**
	Text	
Fundamentals of Information Technology	S.kaur,Bhatia,Gupta and N.kaur	Kalyani Publishers
	Reference	
Fundamental of Computer Programming and Information technology	Gurvinder Singh, Rashpal Singh	Kalyani Publishers

CS-1102 INTRODUCTION TO OPERATING SYSTEMS

L T P **Maximum Sessional Marks: 25**
2 0 0 **Maximum End Term Examination Marks: 25**

Unit - I

INTRODUCTION : A brief history of operating system, Definition of operating system. Operating system classification: single user, multi-user, batch processing, time- sharing, real time operating system, multi-processing Operating system functions

OPERATING SYSTEM CONCEPTS : Definitions: process, program, interrupts, virtual management,swapping, threshing, File, file structure: - stream of bytes, records, file access methods. (09 Hrs)

Unit - II

INTRODUCTION TO MS DOS : MS-DOS structure, booting sequence, OS files, command processor files, definition of a file, file names, booting from floppy and HDD, warm and cold reboot. Introduction to DOS programming & various control structures,DOS utility commands: DELTREE, SCANDISK, SETVER, UNDELETE, UNFORMAT (08 Hrs)

Unit - III

DISK MANAGEMENT COMMAND: FORMAT, CHKDSK, DISKCOPY, ABEL, VOL DISKCOMP, COMP, RECOVER, EDLINE editor commands

BATCH FILE COMMANDS: - ECHO, PAUSE, REM

GENERAL COMMAND: TYPE, DATE, TIME, PROMPT

(07 Hrs)

Unit - IV

INTRODUCTION TO WINDOWS OPERATING SYSTEM: Definition: windows operating system, desktop, file, folder creating files and folders, saving files, deleting files, using task bar, creating icons for different applications, creating shortcuts, opening different applications/programs. (08 Hrs)

Recommended Books:

Title	Publisher	Author
	Text	
Fundamental of Computer Programming and Information technology	Gurvinder Singh, Rashpal Singh	Kalyani Publishers
	Reference	
Learning MS-DOS	Ramesh Bangia	Khanna Publisher

CS-2101 PRINCIPLES OF DIGITAL ELECTRONIS

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit - I

Introduction : Basic differences between analog and digital signals, Application and advantages of digital signals.

Logic Gates : Concept of negative and positive logic, Definition, symbols and truth table of NOT, AND, OR, NOR, NAND and EXOR gates, NAND and NOR gates as universal gates. (11 Hrs)

Unit - II

Number System : Binary, Decimal, Octal and hexadecimal number System,Conversion from decimal Octal and hexadecimal to binary and vice-versa, BCD representation. (12 Hrs)

Unit – III

Binary addition, subtraction and 2's complement method of addition/subtraction. Concept of SOP and POS. Boolean algebra, simplification using k-map (2 and 3 variables only) (12 Hrs)

Unit - IV

Latches and flip flops: Concepts and types of latches with their working and applications. Operation using waveforms and truth tables of RS, T, D, JK. Difference between a latch and a flip flop. (13 Hrs)

Recommended Books:

Title	Author	Publisher
	Text	
Digital Electronics	A. Anand Kumar	Prentice Hall of India
	Reference	
Digital Electronics	RP Jain	Tata Mc-Graw Hills

CS-2102 DESKTOP PUBLISHING (DTP)

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit – I

Introduction : Overview of desktop publishing (DTP)
Page Maker : Documents needs, creating a document, editing and formatting a document, saving and printing a document, inserting text and graphics, inserting columns, fonts & styles, integrating images and graphics from a drawing package in the document, making transparencies**.**

(09 Hrs)

Unit – II

Corel draw : Introduction, exploring a corel draw screen, using dialog boxes, using roll up, create open files, save file, import/export files, and print files. Use of ribbon bar, use of tool box, select object, shaping objects using zoom tool, filling object use of flying tool. Setting up new drawing, setting multi-page document, undo/redo mistakes, repeat. Cut, copy, paste, delete, duplicate, and clone. Insert object, paste special, copy attribute from select all, drawing objects, selecting objects. Page setup, insert/delete page, use of layers, roll up, grid & skill set up, guide line set up.

(08 Hrs)

Unit – III

Formatting objects : Arranging objects; align, order group, and ungroup.
Arranging objects: combine, break apart, weld, and intersection, trim, separate.
Mode edits: to line to curve, stretch, rotate, align, and convert, to curves.
Creating special effects: Transform roll up,clear transformation & perspective,envelope rolls up.
Creating special effects: blend roll up, extrude roll up, counter roll up, power line, power-clip clear effects.
Working with text: Character, paragraph text, frame setting of tabs, indents, bullets, spacing in paragraph text.

(08 Hrs)

Unit – IV

Tools : Filling text to a path, align to base line, straighten text, edit text Using spell checker, type assist, thesaurus, find and replace text, adding symbols, create pattern, preferences

(07 Hrs)

Recommended Books:

Title	**Author**	**Publisher**
Text		
Top publishing from a to z	Bill Grout and Osborne	McGraw hill
Reference		
DTP for pc user	Houghton	Galgotia publishing
Learning Corell Draw9	Ramesh Bangia	Khanna publisher

CS-2103 BASICS OF DATABASES

L T P
2 1 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit - I

Definition: Data, Information, Database, Knowledge, Need for information storage and retrieval. Fields, records,models of databases, hierarchical,networks &relational model Relationships, attribute,entity,entity set, primary and foreign keys.
(08 Hrs)

Unit – II

Various data types available in a database and tables,Creating a database(in access) Creating Tables – Using Wizard, In design view , Create table by entering data, Defining primary keys in tables. Create relationship, Adding modifying and deleting records in an data sheet. Formatting and printing a data sheet
(08 Hrs)

Unit – III

Retrieving the records from a data sheet , Create Query: Using design view and by using Wizard , types of queries: SQL query, crosstab query, etc. (08 Hrs)

Unit - IV

Creating forms and reports: - In design view,- By using wizard, Use of different tool boxes: text box, label, option group, check box, toggle button, option button, list box, combo box etc. (08 Hrs)

Recommended Books:

Title	Author	Publisher
	Text	
DBMS with MS Access	S.S Bhatia and Vikram Gupta	Kalyani Publishers
	Reference	
Learning Access 2000	Ramesh Bangia	Khanna publisher

CS-2104 SYSTEM INSTALLATION

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit - I

Introduction & functioning of various hardware components i.e. CPU, RAM, ROM, Mother Board, serial port, parallel port, CD-ROM drive, sound card LAN card, graphics acceleration card.

The necessary steps for loading of following operating systems to a new computer a) DOS b) Windows c) Window NT-Workstation, Server d) Windows 2000 professional

(04 Hrs)

Unit - II

Installation procedure for various drives required for the functioning of various devices, i.e. CD-ROM, MOUSE and VGA. Installation of ms-office 97/2000/ms visual studio in the system

(04 Hrs)

Unit – III

Installing USB ports on a system so that devices such as a digital camera/web Camera can connect to the system. Installing various printers and activating them to print text pages.

(04 Hrs)

Unit - IV

Installing an internal and external modem to a system including configuring the port to which the modem is connected.

(04 Hrs)

Recommended Books:

Title	**Author**	**Publisher**
Text		
Hardware Bible	W. L. Rosch	Que
Reference		
Upgrading and Repairing Pcs	Muller & Zacker	PHI

CS-2105 TROUBLESHOOTING AND MAINTENANCE OF COMPUTERS

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit - I

Repair, servicing and maintenance concepts : Introduction to servicing and maintenance concepts, meanwhile between failure (NTBF), meantime the repair maintenance policy, potential problems preventive maintenance and corrective maintenance. Concept of shielding, grounding and power supply requirements and considerations of computers and its peripherals. (09 Hrs)

Unit- II

Fundamental troubleshooting procedures: fault location, fault finding aids, Service manuals, Test and measuring instruments, Special tools. (07 Hrs)

Unit- III

Hardware and Software faults: Trouble shooting techniques and methods, Functional area approach, split half method, Divergent, convergent and feedback path circuits, analysis measured techniques. (08 Hrs)

Unit- IV

Troubleshooting of computers, component and peripherals: mother board, HDD, FDD, CD ROM/DVD, Printers, Modems, Monitors. (08 Hrs)

Recommended Books:

Title	Author	Publisher
	Text	
Upgrading and Requiring PC's	Muller and Zacker	PHI
	Reference	
Trouble shooting computer system	Robert C Benner	Mc-Graw Hills

CS-2201 COMPUTER PERIPHERALS

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit - I

Peripheral devices: introduction, need and history, various types of ports: serial port, parallel port , USB port, COM port and LPT port. Introduction to buses.

(10 Hrs)

Unit - II

Input devices : Keyboard, Mouse, Joystick – brief construction & functions/ Floppy disks,hard disk, optical disk,floppy derives &cartridges-construction & types.Information recording and retrieval, Optical disk (CD & DVD). (12 Hrs)

Unit - III

Output devices : CRT–overview of raster scan,CRT tube,elementary principles of scanning & Picture formation, and video signal TV.
Scanner: working and functioning

(12 Hrs)

Unit - IV

Printers : Types of printer –dot matrix, ink jet, line laser printing –their construction, working, principles and command faults.
Plotters : Introduction and working principle of plotters

(14 Hrs)

Recommended Books:

Title	Author	Publisher
	Text	
Computer Hardware	Chauhan	khanna publishers
	Reference	
Computer peripherals and interfacing	Priti Srivastava	Ishan publisher

CS-2202 PROGRAMMING IN 'C'

L T P
3 1 0

Sessional Marks : 25
End Term Examination Marks: 75

Unit - I

Algorithm and Program development:-Steps in developing a program,Flow chart, algorithm development, Program debugging.
Fundamentals of C programming : Basic structure of C programming, execution a program, constants, variables and data type, operators & their precedence, formatted output, assignment statement.

(12 Hrs)

Unit – II

Control statements and their syntax with example:
IF-else:- Simple if statement, simple if else statement, nested if else statement,
Go to: - Backward goto and forward go to
For, while, do-while and its programs
Break, continue,their comparison, **switch** statement,(programs of break, continue & switch statements)

(12 Hrs)

Unit - III

Functions declaration, parameter passing, call by value, local and variables Array declaration,one dimensional array & its programs like:find the greatest no.& smallest no. from a given array, sort an array in ascending and descending order,
find the average and sum of all the elements of an array etc.

(12 Hrs)

Unit – IV

Two dimensional array and its programs like: matrix multiplication, addition and subtraction of two matrices, to find the transpose of matrix. Basic introduction to Structures & Unions.

(12 Hrs)

Recommended Books:

Title	**Author**	**Publisher**
	Text	
Programming with "C" language	C Balaguruswami	Tata Mc-Graw Hill
	Reference	
Let us C	Yashwant Kanetkar	BPB

CS-2203 WEB PAGE DESIGN

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit - I

Definition : World-Wide-Wed (WWW)
Planning a web site: content collection, reorganization and content structuring
Business on the web: Picking URL; launching the web sites, selling product and services online
Promoting the web site: Register with popular search engines, search tools; define metatag and keywords; advertise through media

(08 Hrs)

Unit - II

HTML Fundamentals : working with text , arranging text, working with images, links and lists

(08 Hrs)

Unit – III

Advanced topics : Working with tables, working with frames, style sheets, linking pages and images

(09 Hrs)

Unit – IV

Web authoring tools : Front page: Various menus, making tables, images, marquees, frames, hyperlinks

(07 Hrs)

Recommended Books:

Title	Author	Publisher
	Text	
HTML the Complete Reference	Thomas A Powell	Mc-Graw Hill
	Reference	
Learning HTML 4.0	Ramesh Bangia	Khanna Publisher
Internet and Web Technology	S. Raj Kamal	TMH

CS-2204 INTERNET APPLICATIONS

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

UNIT I

Introduction to World-Wide Web, searching internet using search engines like yahoo, AltaVista, Different methods of internet connectivity.

(12 Hrs)

UNIT-II

Using servicing of internet: File transfer through FTP, Remote login through talent, security issues, E-mail, IRC.

(11 Hrs)

UNIT-III

E-commerce :Electronic data interchange; Electronic file transfer; on-line shopping, selling products and services, Security : encryption, digital signatures etc.

(12 Hrs)

UNIT-IV

Audio and Video conferencing : what is sound and its representation on computer :sampling rate , quantization, Introduction to MIDI standard, capturing graphic and images, image formats, storing graphics, Components of a audio & video conferencing system, Multimedia system.

(13 Hrs)

Recommended Books:

Title	Author	Publisher
	Text	
Practical guide to internet	AB Tiwana	Galgotia publication
	Reference	
Internet Fundamental	Curt Robbins	DDC
Learning Internet & E-mail	Ramesh Bangia	Khanna Publisher

EC- 1101 ELECTRONIC DEVICES AND COMPONENTS

L T P
3 0 0

Sessional Marks: 25
End Term Examination Marks: 50

UNIT-1I

INTRODUCTION: Classification of materials into conducting and insulating materials through a brief reference to atomic structure, Conducting Materials, Insulating Materials, Semi-conductor Materials

(12 Hrs)

UNIT-II

ACTIVE AND PASSIVE COMPONENTS: Introduction to active and passive components; fixed and variable resistances, their various types fixed and variable capacitors, their various types and important specifications and colour codes. Voltage and current sources – concept of constant voltages and constant current sources, symbol and graphical representation, characteristics of ideal and practical sources.

(12 Hrs)

UNIT-III

Semiconductor Diode: Atomic structure of Germanium and Silicon semi-conductors; intrinsic and extrinsic semiconductors, PN junction, basic principles of operation and VI characteristics of PN junction diode, static and dynamic resistance of a diode. Use of a diode in rectifiers, half wave, full wave and bridge rectifier with shunt capacitor filter, series inductor filter, zener diode and its applications, as a voltage regulator, light emitting diode (LED), liquid crystal display (LCD).

(12 Hrs)

UNIT-IV

TRANSISTOR : Introduction to a transistor, working of a PNP and NPN transistor, input and output characteristics, transistor configurations, biasing of a transistor, amplifying action of a transistor, comparison of different configurations, common emitter amplifier circuit, load line, concept, field effect transistor FET, JFET, MOSFET, their characteristics and applications, unijunction transistor (UJT).

(12 Hrs)

RECOMMENDED BOOKS

Text Books:

Title	**Author**	**Publisher**
Basic Electronics	VK Mehta	S. Chand

Reference Books:

Title	**Author**	**Publisher**
Electronic Components and Materials	Grover, Jamwal	Dhanpat Rai
Electronic Components & Materials	SM Dhir	McGraw Hill
Electronic Devices & Linear Circuits	Bhargava & Gupta	McGraw Hill

EC-1201 ELECTRONIC CIRCUITS

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

UNIT-1

SMALL SIGNAL AMPLIFIERS (QUALITATIVE ANALYSIS) : Introduction, Sngle stage transistor amplifier, Frequency response of single stage amplifier,3-dB points, Bandwidth of an amplifier, Cascading of an amplifier, Resistance – capacitance coupling, Transformer coupling, Direct coupling.

(12 Hrs)

UNIT-II

POWER AMPLIFIERS: Classification of amplifier, Need for power amplifier, Difference between power and voltage amplifier, Concept of distortions in power amplifiers, Class B Push-pull amplifier circuits.

(12 Hrs)

UNIT-III

FEEDBACK AMPLIFIERS : Concept of feedback in amplifiers with block diagrams, Types of feedback, Voltage gain of feedback amplifier, Negative feedback and its advantages.

(12 Hrs)

UNIT-IV

OSCILLATORS : Conditions for oscillation, Principles of operation of Wein bridge oscillator, Phase shift oscillators, Hartley oscillators, Crystal oscillators, Tuned collector oscillator.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books:

Title	**Author**	**Publisher**
Basic Electronics and Linear Circuits	N N Bhargava, Kulshreshtha	McGraw Hill

Reference Books:

Title	**Author**	**Publisher**
Principles of Electronics	Albert Paul Malvino	McGraw Hill

EC- 2101 ELEMENTS OF DIGITAL ELECTRONICS

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit I

INTRODUCTION : Basic difference between analog and digital signal, Applications and advantages of digital signals.

NUMBER SYSTEM : Binary and hexadecimal number system: conversion from decimal, octal and hexadecimal to binary and vice versa. BCD representation, Binary addition, subtraction and 1's & 2's complement method of subtraction.

(12 Hrs)

Unit II

LOGIC GATES : Concept of negative and positive logic, Definition, symbols and truth table of NOT, AND, OR NAND, NOR XOR Gates. NAND and NOR as universal gates.

LATCHES AND FLIP FLOPS : Concept and types of latches with their working and applications, Operation using waveforms and truth tables of RS, T, D,JK, Master/Slave JK flip flops, Difference between a latch and a flip flop.

(12 Hrs)

Unit III

COUNTERS: Binary counters, Divide by N ripple counters, decade counter, Pre-settable and programmable counters, Down counters, up/down counter, Synchronous counters (only introduction), Difference between Asynchronous and Synchronous counters.

(12 Hrs)

Unit IV

SHIFT REGISTER : Introduction and basic concepts including shift left and shift right, Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.

Microprocessor: Introduction to micro-processor, architecture of 8-bit microprocessor, memories related to micro-processor

(12 Hrs)

RECOMMENDED BOOKS:

Text Books:

Title	**Author**	**Publisher**
Fundamentals of Digital Circuits	A. Anand Kumar	PHI

Reference Books:

Title	Author	Publisher
Digital Electronics & Micro-processes	RP Jain	McGraw Hill
Digital Electronics	Malvino	McGraw Hill

EC-2102 INTEGRATED CIRCUITS

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit I

INTEGRATED CIRCUITS (ICS) : Definition, Advantages of ICs over discrete components, Integration Types – SSI, MSI, LSI, Classification- Monolithic and hybrid, Monolithic techniques, Monolithic components.

(12 Hrs)

Unit II

OPERATIONAL AMPLIFIERS : Characteristics Ideal, inverting, non-inverting inputs virtual ground, Applications, Inverting, non-inverting amplifier Comparator, Inverter, Adder, Subtractor, Phase shifter, differentiator, integrator.

(12 Hrs)

Unit III

555 TIMER: Simple Block Diagram, Pin configuration,555 as a Mono stable and Astable Multi-vibrator.

(12 Hrs)

Unit IV

IC REGULATORS: 723, 78 and 79 series, pin configuration and use in power supply.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books:

Title	**Author**	**Publisher**
OP-AMP & Linear Integrated Circuits	Gaekwad	PHI

Reference Books:

Principle of Electronics	Albert Paul Malvino	McGraw Hill
Linear Integrated Circuits	D. Choudhary & S.Jain	New Age

EC-2103 FUNDAMENTALS OF RADIO AND TELEVISION

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit I

RADIO: IDEA OF MODULATION : Concept of amplitude modulation (AM), frequency modulation (FM), Frequency spectrum of AM and FM, Idea of double side band and single side band for AM systems, Basic concepts of antenna; Yagi antenna.

TRANSMITTER AND RECEIVER: Block diagram of an AM transmitter and function of various blocks, Block diagram of an AM Receiver and function of various blocks.

TELEVISION

(12 Hrs)

Unit II

ELEMENTS OF TV SYSTEM: TV transmission (video and audio),TV reception, Scanning, flicker, interlaced scanning, aspect ratio, Video and audio signals.

(12 Hrs)

Unit III

CONCEPT OF COMPOSITE VIDEO SIGNAL: Horizontal Synchronous details, Vertical synchronous details, Scanning sequence, Channel bandwidth, Vestigial side-band transmission and reception, TV standards.

(12 Hrs)

Unit IV

PICTURE TUBE AND CAMERA TUBE: Basic concepts of TV camera tubes for example image orthicon, videocon, plumbicon, Monochrome picture tube construction, its characteristics and control.

TV RECEIVER: Block diagram of a TV receiver,Brief description of each stage, EHT

(12 Hrs)

RECOMMENDED BOOKS

Text Books:

Title	**Author**	**Publisher**
Principles of communication Engineering	Anokh Singh	S.Chand

Reference Books:

Electronic Communication Systems	George Kennedy	, McGraw Hill
Monochrome and Colour Television	R.R Gulati	Dhanpat

EC-2104 ELECTRONIC MEASUREMENTS & INSTRUMENTATION

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit I

INTRODUCTION: Accuracy precision, sensitivity, static errors, range, span, repeatability linearity, hysteresis, types of errors, dynamic response, loading effect.

BASIC INDICATING INSTRUMENTS: Classification of instruments, D-Arsonval movement, construction and principle of moving iron and moving coil instruments, construction of dc ammeter, dc voltmeter, ac ammeter, ac voltmeter, ohm meter and analog multi-meter.

(12 Hrs)

Unit II

CATHODE RAY OSCILLOSCOPE: Cathode ray tubes, construction, basic CRO circuit, measurement of voltage, current, phase, frequency, time period dual trace oscilloscope, specifications of a CRO and their significance, front panel controls.

(12 Hrs)

Unit III

DIGITAL INSTRUMENTS: Block diagram, principle of operation and use of LCR meter, frequency meter, and digital multi-meter.

(12 Hrs)

Unit IV

SIGNAL GENERATORS: Standard Signal Generators, Square Wave Generators, Function Generators, Spectrum Analyser: Waveforms, block diagrams and controls.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books:

Title	**Author**	**Publisher**
Electrical and Electronic Measurements & Instrumentation	AK Sawhney	Dhanpat Rai

Reference Books:

Electronic Measurement and Instrumentation	HW Cooper	Prentice Hall
Electrical Measurements	Umesh Sinha	Dhanpat Rai

EC-2201 INDUSTRIAL ELECTRONICS

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit I

POWER DEVICES : Symbols, specifications and testing of SCRs, DIACS, TRIACS, Power Transistors, UJT. Characteristics of the above devices, Protection circuits for the above devices.
(12 Hrs)

Unit II

CONVERTERS AND INVERTERS : Basic principle of phase control, Basic waveforms of single phase full wave mid point and bridge circuit (both fully controlled and semi-controlled),Principle of chopper operation, classification and control strategies (only class and chopper),Principle of operation of inverters ,Single phase inverter using thyristors (Mc Murray-Bedford series and parallel inverters).
(12 Hrs)

Unit III

POWER SUPPLIES : Explanation of working of SMPS with the help of a Block diagram, Explanation of working of CVT with the help of a Block diagram, Explanation of working of UPS with the help of a block diagram, One most commonly used topology of the above devices, Circuit explanation of battery chargers using thyristors.
(12 Hrs)

Unit IV

APPLICATION OF POWER DEVICES IN FABRICATION OF VARIOUS TYPES OF CONTROL CIRCUITS SUCH AS: Temperature Control, Illumination Control, Level Control, Burglar Alarm Control, Electrical Heating and Welding Control, AC/DC Drive Control.
(12 Hrs)

RECOMMENDED BOOKS

Text Books:

Title	**Author**	**Publisher**
Industrial Electronics and Control	SK Bhattacharya, S Chatterji	Tata McGraw Hill

Reference Books:

Projects in Electrical & Electronics Engineering	SK Bhattacharya, S Chatterji	Wheeler Publishing
Power Electronics	PS Bimbhra	Khanna Publishers

EC-2202 INTRODUCTION TO TRANSDUCERS

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit I

INTRODUCTION : Definition of transducers, classification of transducers, primary and secondary, active and passive, analog and digital selection criteria of transducers.

(08 Hrs)

Unit II

RESISTIVE TRANSDUCERS : Principal and application of potentiometers, strain gauges, load cells, thermistors, humidity sensors.

(08 Hrs)

Unit III

INDUCTIVE TRANSDUCERS : Basics of inductive transducers, construction and principle of operation of LVDT, RVDT and variable reluctance type transducers.

(08 Hrs)

Unit IV

CAPACITIVE TRANSDUCERS : Basics of capacitive transducers, transducers using change in area of plates, distance between plates and dielectric constant.

(08 Hrs)

RECOMMENDED BOOKS:

Text Books:

Title	**Author**	**Publisher**
Electrical and Electronic Measurement & Instrumentation	AK Sawhney	Dhanpat Roi

Reference Books:

Instruments and Measurements	Kumar	Dhanpat Rai
Electronics Instrumentation	HS Kalsi	McGraw Hill

EC-2203 CONSUMER ELECTRONICS

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit I

AUDIO SYSTEMS : Microphones: Construction, working principles and applications of microphone: carbon, moving coil, crystal, condenser type.
Loud Speakers: Direct radiating, horn, loaded woofer, tweeter, mid range, multi speaker system and baffles.

(12 Hrs)

Unit II

PA Systems: Block diagram, setting up of PA system (general requirements, positioning of microphones and loudspeakers, indoors and outdoor installation of
tape recorder)
Sound recording on magnetic tape, its principles, book diagram and tape transport mechanism, digital sound recording on tape, CD systems, Hi-Fi systems, pre-amplifiers, amplifiers, Stereo Amplifiers.

(12 Hrs)

Unit III

VIDEO CASSETTE RECORDER (VCR) : Principle of Video Recording on magnetic tape, block diagram of VCR, VHS Tape, transport mechanism.

(12 Hrs)

Unit IV

BASIC BLOCK DIAGRAM, WORKING PRINCIPLES AND APPLICATIONS OF THE FOLLOWING: Digital watch/clock: Calculator, Washing machine, Microwave ovens ,Electric oven ,Electronics ,Cordless telephone, Telephone Instruments, Answering machine, Fax machine, Photostat Machine, Mobile phone,VCD player, Digital Camera, Cellular phone.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books:

Title	**Author**	**Publisher**
Consumer Electronics	B.R Gupta	S.K. Kataria & Sons

Reference Books:

Audio and Video System	Sanjay Attri	BPB Publisher
Audio & Video Systems	R.G. Gupta	McGraw Hill

EC-2204 TELEVISION ENGINEERING

L T P
3 0 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit I

INTRODUCTION TO MONOCHROME TV : Circuit description and working principle of Video detector, Video amplifier, AGC (delayed and keyed), Synchronous separator, Synchronous process, Vertical deflection circuit, Horizontal deflection circuit, Horizontal driver, RF Tuner, Video IF amplifier, Audio output section.

(12 Hrs)

Unit II

Receiver power supply, Regulated power supply, SMPS

CABLE TV SYSTEM : Block diagram of cable TV system circuit from Dish to user and CCTV.

(12 Hrs)

Unit III

COLOUR TV : Luminance signal, Compatibility with monochrome TV, Saturation, chrominance, Colour difference signal, Polarity, Modulation, Colour burst, Introduction to SECAM and NTSC System, PAL TV System, PAL –D System, PAL – D Colour receiver.

(12 Hrs)

Unit IV

Colour signal processing, Sub carrier generation, Brief introduction of remote control Colour TV picture tubes, like delta gun, trintron, precision in line, Introduction to Plasma and LCD Television, Introduction to DTH.

(12 Hrs)

RECOMMENDED BOOKS :

Text Books

Title	**Author**	**Publisher**
Monochrome and Colour TV	R.R. Gulati	Dhanpat Rai

Reference Books

Basic Television,Theory and Servicing	Zbar	McGraw Hill
Basic TV and Video Systems	Bernard Grob	McGraw Hill

EC-2205 AUDIO VIDEO SYSTEMS

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit I

MICROPHONES AND LOUD SPEAKERS : Working principle of condenser microphone, collar microphone, carbon, piezoelectric moving coil, Horn type speaker, woofer, tweeter, mid-range speaker, Crossover network.

(08 Hrs)

Unit II

PUBLIC ADDRESS SYSTEM : Type of amplifier, Horn unit, echo unit, mixer-their working principle and specification.

(08 Hrs)

Unit III

CD/DVD RECORDER/PLAYER : Block diagram and its explanation; explanation of various controls; audio recording and playback; heads, stereo recording; tape speed, signal biasing.

(08 Hrs)

Unit IV

VIDEO CD PLAYER/RECORDER : Principles of video recording on magnetic tapes; video tape recording medium, video cassette format; video cassette specification.

(08 Hrs)

RECOMMENDED BOOKS

Text Books

Title	**Author**	**Publisher**
Audio and Video Systems	R.G. Gupta	Mc Graw Hill

Reference Books

Basic TV and Video Systems	Bernard Grob	Mc Graw Hill
Audio and Video Systems	Sanjay Attri	BPB Publication

EE-1101/EE-1201 FUNDAMENTALS OF ELECTRICAL ENGINEERING

L T P
2 1 0

Sessional Marks: 25
End Semester Examination Marks : 50

UNIT – I

DC Circuits : Concepts of electricity, Definition and units of following terms, Potential and potential difference; Current; Resistance, Electrical Power; Electrical Energy, Ohm's law and its practical applications, Effect of temperature on resistance, Connection of resistance in series and parallel, Kirchoff's laws and their applications to simple circuits (12 Hrs)

UNIT – II

AC Fundamentals : Difference between ac and dc, Terms related with ac waves, RMS and average values of sinusoidal waves, phase and phase difference, Representation of sinusoidal quantities by means of phasors, Alternating voltage applied to pure resistance, Alternating voltage applied to pure inductance, Alternating voltage applied to pure capacitance, R-L series circuit, R-C series circuit, Impedance triangle, Power and power factor in ac circuits (12 Hrs)

UNIT – III

Chemical Effects of Current : Faraday's law of electrolysis, Construction and working principle of storage batteries, Common faults in batteries and their remedy. (06 Hrs)

Electrical Safety : Precautions while working with electricity, Electric shock, effect of electric shock and precautions against shock, Treatment of electric shock. (06 Hrs)

UNIT – IV

Electromagnetic Induction : Concept of magnetic field, Concept of magnetic flux, reluctance, mmf, permeability, Faraday's law and Lenz's law, Fleming's Left Hand and Right Hand Rule, Self and mutual induction, Construction and working principle of single phase transformer, Principle of Motor and Generator (12 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Book		
Elements of Electrical and Electronics	Tarlok Singh	S.K Kataria & sons
Reference Books		
Basic Electrical Engineering	P S Dhogal	TMH
A text book of electrical technology, vol- I and II	B L Thereja	S Chand & Co.
Basic electricity	B R Sharma	Satya Prakashan
Basic Electrical Engineering	J B Gupta	S K Kataria & Sons
Experiments in basic electrical engineering	SK Bhattacharya KM Rastogi	New International Publishers
Experiments in Basic Electrical Engineering	G P Chhalotra	Khanna Publishers

EE-1102 BASIC ELECTRICAL & ELECTRONICS ENGINEERING

L T P **Sessional Marks:25**
2 1 0 **End Term Exam Marks:50**

Unit – I

Introduction : Definition of voltage, current, electrical energy and units, emf, resistance and internal resistance, grouping of resistances, factors affecting resistance of conductor, Kirchoff's laws, joules heating law and simple problems.

(06 Hrs)

Electromagnetic Induction : Biot Savart's law its applications, force on current carrying conductor inside the magnetic field, Fleming's left hand rule, Faraday's law of electromagnetic induction, emf induced in conductor moved in magnetic field, and loop rotated in magnetic field, Fleming's right hand rule, concept of self and mutual induction, simple problems.

(06 Hrs)

Unit – II

A.C. Fundamentals : Definition of frequency, phase, phase difference, reactance, average value and r.m.s. value of an a.c., form factor, peak factor, a.c. through pure resistor, inductor, capacitor, and series LCR circuit, power in ac (no derivation) types of power and relation between them, power factor its importance and improvement, simple problems.

(12 Hrs)

Unit – III

Electronic components : Active and passive components, p-type nad n-type semiconductors, pn-junction diode, diode as rectifier, ripple factor, elentary idea of transistor (npn & pnp), transistor as amplifier, symbols of SCR, Diac, Triac.

(06 Hrs)

Fuses and earthing Electric Shocks : Fuse, types, need, rating and selection of fuse, earthing, need of earthing, types, electric shock precautions and treatment.

(06 Hrs)

Unit – IV

Electrical Machines : Basic principle of ac/dc motors, transformer its equation of emf, turns ratio, applications, related numerical.

(12 Hrs)

RECOMMENDED BOOKS:

Title	**Author**	**Publisher**
Text Book		
Elements of Electrical and Electronics	Tarlok Singh	S.K Kataria & sons
Reference Books		
Basic electrical Engg	P.S. Dhogal	Tata McGraw Hill
Fundamentals Of Physics Extended Fifth Edition	David Halliday,; Resnick, Robert	John Wiley & Sons
Basic electrical Engg	Gupta	Dhanpat Rai
Basic electrical Engg	M.L. Anwani	Dhanpat Rai
Principle of electrical & electronics Engg	J.S. Dhillon	Kalyani
Basic Electrical Engineering	S Marwaha &H M Rai	Satya Parkashan

EE-2101 ELECTRICAL MACHINES-I

L T P
3 1 0

Sessional Marks : 25
End Term Examination Marks: 75

Unit – I

DC Generator : Working principle, conversion of AC to DC by commutator, parts of DC generator, types of winding on the armature, emf equation of generator, types of dc generator, characteristics of series shunt and compound generators.

(12 Hrs)

Unit – II

DC Motor : Working principle, terms used-back emf torque, speed, characteristics of dc shunt, series and compound motors and their applications, use of starters, three point starters, four point starters.

(12 Hrs)

Unit – III

Transformers (Part-1) : Overview of electromagnetic induction, self and mutual induction, construction and working principle of single phase transformer, construction of different types (core and shell type) of transformers, emf equation, turn ratio, transformer on no-load, losses.

(12 Hrs)

Unit – IV

Transformers (Part-II) : Methods of determining losses-short circuit and open circuit tests, efficiency, rating, auto transformers and instrument transformers, idea of 3-phase transformers, difference between power and distribution transformers.

(12 Hrs)

RECOMMENDED BOOKS :

Title	**Author**	**Publisher**
Text Book		
Principle of electrical & electronics Engg	J.S. Dhillon	Kalyani
Reference Books		
Electrical machines	S K Sahdev	Unique Pub
Electrical machines	SK Bhattacharya	TMH
Basic electrical engineering vol-I and II	P S Dhogal	TMH

EE-2102 ELECTRICAL POWER SYSTEMS

L T P
3 1 0

Sessional Marks : 25
End Term Examination Marks: 75

Unit – I

Overview of power system: Generation: Hydro, thermal, nuclear and gas based stations, diesel generating stations, Transmission: Importance of high voltage transmission, introduction to transmission losses, EHV, AC and HV DC transmission, and layout of a transmission substation, Distribution: Ring and radial distribution system, layout of a distribution substation, common distribution voltage in India, list of equipment and accessories used in distribution system.

(12 Hrs)

Unit – II

Bushing: Introduction and classification of bushing, transformer, bus duct, neutral, motor terminals and DC applications of bushings.

(04 Hrs)

Earthing: Significance of earthing, need of earthing, types of earthing, earth electrodes, earth continuity conductor, method of improving earthing, earthing of transmission lines, distribution line, power equipment and domestic gadgets and service mains.

(08 Hrs)

Unit – III

Relays and Circuit Breakers: Types and relays, their working principle of operation, difference between fuse, isolator and circuit breaker, types of isolators and circuit breakers, operation of air, oil and vacuum circuit breakers.

(12 Hrs)

Unit – IV

Insulators: Types of insulators- pin type, suspension type, shackle type, strain type insulators, and voltage rating of insulators.

(12 Hrs)

RECOMMENDED BOOKS

Title	**Author**	**Publisher**
Text Book		
Basic electrical engineering	J B Gupta	TMH
Reference Books		
Basic electrical engineering	M L Anwani	Dhanpat Rai & Sons
Basic electrical engineering	B R Sharma	Satya Prakashan
Principles of electrical power system	V K Mehta	S Chand & Co

EE-2103 ANALOG AND DIGITAL ELECTRONICS

L T P
3 1 0

Sessional Marks : 25
End Term Examination Marks: 75

Unit – I

Introduction : Concepts of amplifier, positive and negative feedback and oscillator.

(12 Hrs)

Unit – II

Operational amplifiers : Characteristics of an ideal operational amplifier, inverting and non-inverting configurations, use of operational amplifiers as inverting and non-inverting amplifiers, adders, sub tractors, differentiators, integrator and comparator.

(12 Hrs)

Unit – III

Voltage regulator ICs: Concept of voltage regulation, specifications and applications of 3-terminal voltage regulator ICs (78xx and 79xx series).

(12 Hrs)

Unit – IV

Digital Electronics: Difference between analog and digital signals, binary and hexadecimal number systems, conversion between decimal to binary, decimal to hexadecimal and binary to hexadecimal number, Definitions, symbols and truth table for NOT, OR, AND, NAND, NOR, XOR, gats and RS, T, D, JK flip-flops, Logic familiarization and familiarization with commercial digital ICs.

(12 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Book		
Principle of electrical & electronics Engg	J.S. Dhillon	Kalyani
Reference Books		
Principles of electronics	V K Mehta	S Chand and Co
Digital fundamentals	Malvino and Leach	TMH
Integrated electronics	Botkar	Khanna Publishers

EE-2104 ELECTRICAL ESTIMATION AND COSTING

L T P
3 1 0

Sessional Marks : 25
End Term Examination Marks: 75

Unit – I

Introduction : Electrical Symbols; Conductors; Insulators; Wires and Cables; Types of wires used for internal wiring; Types of house wiring; Conduit accessories and fittings; Lighting accessories; Miniature circuit breaker; Fuses and their types; Light and fan circuits.

(08 Hrs)

Illumination Schemes in Buildings and Calculations : Basic definitions; Electric lamps and their types; Design of indoor lighting schemes; Method of lighting calculations.

(04 Hrs)

Unit – II

Conductor Size Calculations: Specifications of Cables, Conductor size calculations for underground cables and house wiring.

(12 Hrs)

Unit – III

Internal wiring Estimates in Domestic Installations : Definition and measurement of points and wiring; Electric substation and wiring installations; Electric installations in buildings; Control at commencement of supply; Types of switch boards; Capacity of Circuit; Internal wiring estimates; Sequence to be followed in carrying out the estimate; Definition and positioning of equipment; Location of various outlets in house wiring.

(12 Hrs)

Unit – IV

Internal wiring Estimates in Industrial Installations : Electrical Installations in small industries; Power circuits and estimation, Selection of wires; Selection, rating and installation of necessary equipment on the main switch board; Estimation of material required and costing for industrial installations.

(12 Hrs)

RECOMMENDED BOOKS:

Title	**Author**	**Publisher**
Text Book		
Electrical estimating and costing	Surjit Singh	Dhanpat Rai & Co
Reference Book		
Electrical Engineering Drawing	Surjit Singh	Kataria publications

EE-2201 ELECTRICAL MEASUREMENTS AND INSTRUMENTATION-II

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit – I

Introduction : Introduction to various electrical parameters (viz. voltage, current, power, power factor and energy) and their units. Familiarization with analog and digital measuring instruments for above mentioned electrical parameters.

(08 Hrs)

Unit – II

Measurement of power and energy: Measurement of power, power factor, energy etc and various instruments to measure these electrical quantities, different types of watt meters and energy meters, their basic working principle.

(08 Hrs)

Unit – III

Special Measuring Instruments : Study of construction and working of a frequency meter, power factor meter, ohmmeter, synchroscope.

(08 Hrs)

Unit – IV

Measurement of non-electrical quantities: Preliminary idea about measurement of temperature, pressure, humidity, speed etc

(08 Hrs)

RECOMMENDED BOOKS

Title	**Author**	**Publisher**
Text Book		
Electrical and electronics measurement and instrumentation	A K Sawhney	Dhanpat Rai & Co
Reference Book		
Basic electrical engineering	P.S.Dhogal	TMH
Electronic measurements & instrumentation	Rajendra Prasad	Khanna Publishers
Electrical measurement	J B Gupta	S K Kataria and Sons

EE-2202 NON-CONVENTIONAL ENERGY SOURCES

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit – I

Introduction : Different energy sources, energy scenario in India.

(08 Hrs)

Unit – II

Types of energy sources: Conventional and non-conventional (solar, wind, geothermal and biogas)

(08 Hrs)

Unit – III

Energy Management : Energy conservation, Use of energy efficient devices (CFL etc), structures Effect of power factor and its improvement, Introduction to tariffs and different tariff.

(08Hrs)

Unit – IV

Fuel Cell : Introduction, Types of fuel cell, DFC (Direct Fuel Cell)

(08 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Book		
Non-conventional energy resources	D.S Chauhan	New Age
Reference Book		
Environmental impact assessment	Martinus	Nijhoff Publications
Energy and Ecologiocal Modeling	WJ Initsch	Elsevier Scientific Publishing Co
Energy Future, Human Values and Lifestyle	Richard C Carlson	International West View Press,
Non-conventional energy sources	G.D Rai	Khanna

EE –2203 ELECTRICAL MACHINES-II

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit – I

Three-phase induction motors: Working principle, construction (slip ring and squirrel cage), concept of slip, torque-slip, characteristics, starting of 3-phase induction motors, DOL and star delta starters.

(08 Hrs)

Unit – II

Single phase induction motors: Basic principle of split phase induction motors, capacitor start, capacitor run, capacitor start and run type, shaded pole, universal, reluctance, hysteresis and ac series motors and their applications.

(08 Hrs)

Unit – III

Alternators : Working principle, Parts, Types of slots, Rotor, Frequency and speed, emf equation of alternators, construction and types of alternators, parallel operation of two or more alternators.

(08 Hrs)

Unit – IV

Synchronous motor: Working principle, Starting method, behaviour of synchronous motors, pull in torque and pull out torque, V-curves, applications.

(08 Hrs)

RECOMMENDED BOOKS:

Title	**Author**	**Publisher**
Text Book		
Electrical machines	SK Bhattacharya	TMH
Reference Books		
Electrical machines	B R Sharma	Satya Prakashan
Electrical engineering	S K Sahdev	Unique Indian Publishers
Electrical technology vol-II	B L Theraja	S Chand and Co
Electrical Machines	Tarlok Singh	S.K Kataria & sons

EM-1101 Fundamentals of General Engg.

L T P
4 0 0

Sessional Marks: 25
End Semester Exam Marks: 75

UNIT-I

(13 hrs)

Definition of Voltage , Current, Power, Energy etc. with there units , Differences between AC and DC , Various application of electricity , Advantage of Electrical energy over other type of Energy , Distinction between single phase and Three phase , Name the different instruments used to measure voltage, current and energy , Pictorial diagram of a three phase transmission and distribution system.

Brief function of following accessories Transformer, Supports, Conductors and insulators.

UNIT-II **(12 hrs)**

Various accessories and parts of installation and identification of different wiring systems, Different types of circuits like circuit to control one lamp with one switch, circuit to control one lamp with two-way switch, circuit to control one lamp, fan and 3-pin outlet socket by single way switch, circuit to control the three phase motor , Purpose of earthing , different method of earthing , Other safety precautions while working on Electrical Equipments.

Principle, construction and working of AC and DC motors , Introduction to different type of AC motors i.e. Single phase, three phase , Various applications of Single and Three Phase motors , Distinctions between Single and Three phase motors.

UNIT-III **(15 hrs)**

Transmission of power through belt, rope drives and pulleys, gears and chains, Different type of pulleys and their applications , Chain drive and its comparison with belt drives. Gear derives; type of gears; simple gear trains and velocity ratio

Classification and application of IC Engines; Working principles of two stroke; four stroke petrol and diesel engines , Cooling system and lubrication of IC engines , General maintenance of engines

UNIT-IV (10 hrs)

Basic principles of refrigeration and air conditioning, Working of centralized air conditioning ,Concept of split air conditioning and its applications.

General idea of raw material used for construction, introduction to different construction techniques, Properties and uses of Bricks, lime, cement and timber.
Brief idea about the different types of Foundation . Concrete proportions, mixing water ratio, RCC and its uses (Elementary idea only)

Instruction Strategy

While imparting instructions , teachers are expected to lay more emphasis on the concepts and principles . It will be better if the classes for the general engg. Are conducted in the laboratories and organized demonstration for explaining various principles .

FT-1101 INTRODUCTION TO FOOD SCIENCE AND TECHNOLOGY

L T P
2 1 0

Sessional Marks: 25
End Term Examination Marks: 50

Unit I

Introduction : Definition of food science and food technology; present status of food industry in India; importance of food in diet; sources of plant and animal food in India- their production and extent of post harvest losses

(12 Hrs)

Unit II

Classification of food: Classification of food on the basis of origin- plant, animal, marine; functions- physiological, psychological, social; nutrients- energy giving, body building, regulatory; pH- low acid, medium acid and high acid foods; and storage- highly perishable, semi-perishable and non-perishable

(11 Hrs)

Unit III

Food composition and uses: Cereals, Fruits and Vegetables, Milk and Milk Products, Egg, Meat and Fish; Macro and micro constituents of food; utritional status of various foods

(10 Hrs)

Unit IV

Physico-chemical properties of food : Colloids, Osmosis, Emulsions, Foams, Hydrogen ion concentration (pH), Acidity, Water activity

(05 Hrs)

Preservation : Causes of food spoilage; principles and methods of food preservation (an overview)

(05 Hrs)

Recommended books:

Authors	Title	Publishers
Desrosier	Introduction to food science	CBS
Potter	Food science	CBS
W.C. Frazier.	Food microbiology	TMH
Fennema, Kerrel	Principles of food preservation	Marcel Dekkar

FT-1201 POST HARVEST TECHNOLOGY

L T P
2 1 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit I

Introduction: Physical properties of food material like size, shape, density, specific gravity, thousand kernel weight, bulk & true density and their importance.

(06 Hrs)

Material Handling : Material handling equipments like belt conveyer, screw conveyor, pneumatic conveyor, bucket elevator

(07 Hrs)

Unit II

Cleaning, Sorting and Grading : Types of contaminants; Methods of cleaning: Dry and wet cleaning; Sorting and grading of various food materials; an overview of different types of sorters and graders based on weight, size, shape and density.

(10 Hrs)

Unit III

Drying : Basic concepts of drying; types of water in food materials; purpose and overview of different methods of drying; various types of dryers- tray drier, fluidized bed drier, drum drier, spray drier, freeze drier

(06 Hrs)

Size Reduction : Purpose and general principles of size reduction; size reduction equipments: compress rolls, hammer mills, Disc mill, ball mills and homogenizers

(06 Hrs)

Unit IV

Storage : Importance of storage; Basic factors affecting the storage of perishable and non-perishable food materials; storage structures for fruits and vegetables like cold store and storage structures for grains like steel bin, aluminum bin, cement masonry bin and godown (an overview)

(10 Hrs)

RECOMMENDED BOOKS:

Authors	**Title**	**Publishers**
Chakraborty, A.	Post harvest technology of cereal, pulses & oilseeds	Oxford & IBH
Singh and Sahay	Unit operations in Agril processing	Vikas Pub
P. Fellows	Food Processing	Woodhead

FT-2101 PRINCIPLES OF FOOD PROCESSING ANID PRESERVATION

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit I

Scope and Trends in Food Industry : Definition of food, food science, food technology and food preservation; Importance of food processing and preservation; Classification of foods on the basis of shelf life, pH, origin; Different types of food spoilage viz. microbiological, enzymatic, chemical and physical and their effects on food quality

(08 Hrs)

Unit II

Low Temperature Preservation : Low temperature required for different foods Refrigeration, slow and fast freezing, freezing process; Types of freezer and their advantages and disadvantages; Storage and thawing of frozen food

(08 Hrs)

Unit III

High Temperature Preservation: Canning: Definition, advantages and disadvantages; can formation; Unit operations in canning: selection of raw material, peeling/coring, blanching, filling, brining/syruping, exhausting, sealing, processing, cooling, labeling and storage

(08 Hrs)

Unit IV

Moisture Removal : Drying and dehydration methods- solar, cabinet, Tray and drum.

(04 Hrs)

Chemical preservatives in food preservation.

(02 Hrs)

Radiation preservation of foods.

(02 Hrs)

RECOMMENDED BOOKS:

Authors	Title	Publishers
Desrosier	Technology of food preservation	CBS
Fennema. Karrel	Principles of Food Science Vol-I	AVI

FT-2102 TECHNOLOGY OF FRUITS AND VEGETABLES

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit I

Introduction : Difference between fruits and vegetables; Classification of fruits and vegetables; Food standards and Laws; Specifications for various raw and processed food products.

(10 Hrs)

Unit II

Extraction of Fruit Juice/Pulp : Selection of raw material, crushing, grating/pulping, pressing, filtration, clarification and preservation of fruit juice/pulp, packaging material requirements for fruits and vegetable processed food

(12 Hrs)

Unit III

Fruit Products : Definition, Flow Sheet and brief discription of each step in the preparation of RTS, Squash, cordial. Crush, jam, Jelly, Marmalades, Preserves, Candies, Fruit bar.

(10 Hrs)

Unit IV

Vegetable Products: Flow sheets and brief description of tomato products (soup, sauce, ketchup, puree, paste), pickles and chutney, canned, dried and chemically preserved vegetable products

(10 Hrs)

RECOMMENDED BOOKS:

Authors	**Title**	**Publishers**
Girdhari Lal, Sidappa and Tandon	Fruits and Vegetables preservation	ICAR, New Delhi
Srivastava	Technology of Fruits and Vegetables	

FT- 2103 TECHNOLOGY OF MILK AND MILK PRODUCTS

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit I

Introduction Scope and status of dairy industry in India; definition of milk, market milk and composition; Physico-chemical properties of milk; milk procurement and pricing pattern in Indian dairy plants

(10 Hrs)

Unit II

Milk reception operations : Unloading, grading, weighing, testing, platform tests

(03 Hrs)

Liquid milk processing, Receiving, clarification, standardization, homogenization, pasteurization, filling, storage and distribution

(07 Hrs)

Unit III

Special milks: Flow sheet of sterilized, flavoured, toned, double toned, skimmed, condensed and evaporated milks

(10 Hrs)

Unit IV

Milk products : Flow sheet for the manufacturing of butter, milk powder and ice cream

(07 Hrs)

Traditional milk products, Khoa, Paneer, Sri-khand, Lassi, Desi ghee, Dahi, Chhana

(03 Hrs)

RECOMMENDED BOOKS

Authors	Title	Publishers
Su Kumar De	Outlines of Dairy Technology	Oxford
Lampart	Dairy products	Tata McGraw Hill

FT-2104 ELEMENTARY FOOD ANALYSIS

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit-1

Introduction : Definition of Food Analysis, Food quality, Types of food analysis: Importance and basic criteria; Food adulteration: Definition, types, purpose of food adulteration, a basic concept.

(04 Hrs)

Adulteration Detection in Fats And Oils : Types of adulterants in fats and oils; organoleptic evaluation of fats and oils; tests for the detection of argemone oils, caster oil, oil soluble coal tar dies, presence of sesame oil, tests for mineral oil, mustard oil in other oils

(05 Hrs)

Unit-1I

Adulteration Detection in Milk and Milk Products : Detection of water, neutralizers, preservatives, stabilizers, skim milk addition; metanil yellow in ice-cream and milk based sweets; rancid stuff, synthetic colouring in ghee.

(08 Hrs)

Unit-1II

Adulteration Detection in Cereal Pulses and Oils Seed and Their Products : Extraneous sand and silica in atta, sugi, maida; Metanil yellow in pulses; rancidity in biscuits; kesari dhal in pulses/Besan; lead chromate in pulses; excessive sand and chalk powder in wheat flour; Hidden insects infestation in food grains; chalk in sugar, chalk powder in jiggery

(08 Hrs)

Unit-1V

Adulteration detection in Spice, condiments and plantation crops : Extraneous sand and silica in spices and tea; non-tender stalk and stem in tea; colour in common spices : turmeric and chilly etc.; papaya seeds in black peeper; powdered bran and sawdust in spices (ground); brick powder, sand dirt in chillies; choti elachi seeds in badi elachi seeds; starch of cereals in turmeric powder; lead chromate in turmeric; grass seeds coloured with charcoal dust in cumin seeds; stones, earthy matter, chalk in Asafoetida (Heeng); white powder stone, chalk in common salt

(08 Hrs)

Recommended Books

Author	Title	Publisher
M.. Swarninathan	Food Science Chemistry and Experimental Food	Bappco
	PFA Rule Book	AIFOA New Delhi
	Quality Control lab manual	

FT-2201 FUNDAMENTALS OF MICROBIOLOGY

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit I

Introduction : Classification of living system: Whittaker's five Kingdom concept, Definition of Microbiology; Historical developments in Microbiology

(06 Hrs)

Classification of microorganisms: Unicellular; Multicellular; Prokaryotes; Eukaryotes, Cell and cell organelles: ribosome, mitochondria, endoplasmic reticulum, vacuoles etc

(06 Hrs)

Unit II

Bacteria : Cell- structure, size & shapes; Types depending upon different requirements, Gram positive and negative bacteria; Mode of reproduction

(11 Hrs)

Unit III

Fungi: Cell structure of yeasts and moulds; distinguishing characteristics of fungi, importance of fungi

(11 Hrs)

Unit IV

Food microbiology: An overview; food poisoning and food borne infections: an introduction; Permissible limits of counts of different microorganisms in natural and processed foods and its importance

(10 Hrs)

RECOMMENDED BOOKS:

Authors	**Title**	**Publishers**
Michal. J Pleczer	Basic Food Microbiology	Chapmen and Hall
W.C. Frazier	Food Microbiology by	Tata McGraw Hill
James M. Jay	Modern Food Microbiology	CBS

FT-2202 FOOD GRAIN PROCESS TECHNOLOGY

L T P **Sessional Marks: 25**
3 1 0 **End Term Examination Marks: 75**

Unit I

Introduction : Importance of cereals, pulses and oilseeds in human nutrition; structure and composition of selected cereals, pulses and oilseeds.

(06 Hrs)

Wheat : Types of wheat; traditional and modern methods of wheat milling(an overview); wheat milling products- whole wheat flour (Atta), wheat flour (Maida), semolina, wheat germ, bran.

(06 Hrs)

Unit II

Rice : Types of rice; Paddy parboiling (concept, advantages, disadvantages); milling of paddy; milling products- head broken and brewers rice, rice husk, rice bran

(06 Hrs)

Maize : Types of maize; milling of corn (an overview); milling products and uses

(05 Hrs)

Unit III

Milling of Pulses : Traditional milling methods (dry and wet milling); Modern milling methods (CFTRI and Pantnagar); Advantages and disadvantages of these methods

(11 Hrs)

Unit IV

Oilseed Processing : Pre-treatments of raw material; Mechanical oil extraction methods- Ghani and Oil Expeller; Flow sheets for extraction of cottonseed, rapeseed/mustard, groundnut, sunflower and soybean oil; Brief description of various oil refining steps; Introduction to hydrogenation

(12 Hrs)

Recommended Books:

Authors	**Title**	**Publishers**
RL Kent	Cereal Technology	AVI
A Chakraverty	Post harvest Technology of Cereals Pulses and Oil Seeds	Oxford and IBH
	Hand Book of Oils, Fats & Derivatives with Refining and Packaging Technology	EIRI Board EIRI

FT-2203 FOOD BEVERAGES

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit I

Water for beverages : Potable water quality parameters; treatment of water for beverages industry; Microbiological status; Water standards for beverages; Mineral water - Specification, processing and packaging

(11 Hrs)

Unit II

Carbonated non-alcoholic beverages : General methods of preparation and inspection; Chemical composition and nutritive value; Functions of ingredients used in these beverages; Bottling and packaging of soft drinks

(11 Hrs)

Unit III

Coffee and Tea Processing : History, area in India under production coffee and tea types, Production practices, Flow diagram for the processing of tea and coffee

(10 Hrs)

Unit IV

Introduction to alcoholic beverages : Different types of alcoholic beverages and flow diagram for their manufacturing

(10 Hrs)

RECOMMENDED BOOKS

Authors	**Title**	**Publishers**
Potter and Hotchkisn	Food Science	CBI publication
M.. Swarninathan	Food Science Chemistry and Experimental Food	Bappco
Ashurst	Chemistry and Technology of Soft Drinks and Fruit Juices	Sheffield Academic Press

FT-2204 BAKERY AND CONFECTIONERY TECHNOLOGY

L T P **Sessional Marks: 25**
3 1 0 **End Term Examination Marks: 75**

Unit I

Introduction : Definition of bakery products; Raw materials for bakery products and their functions in bread, biscuits, cake, pastry, buns and traditional products

(12 Hrs)

Unit II

Bakery Products : Flow sheet with brief description of bakery products (i) Bread (ii) Buns (iii) Bread rolls (iv) Biscuits (v) Cakes (vi) Rusks (vii) Pastries (viii) Traditional bakery products

(14 Hrs)

Unit III

Confectionery products : Flow diagram and brief description of hard boiled candies and fruit peel candies

(04 Hrs)

Packaging materials : Packaging types, requirements and materials

(04 Hrs)

Hygiene Practices : Importance of hygiene in bakery plants, various cleaning agents and disinfectants

(04 Hrs)

Unit IV

Machinery and Equipments : Bakery equipments (Sieves, mixers, dough divider, moulder sheeter, proofing chamber, oven, cooling chamber.

(10 Hrs)

RECOMMENDED BOOKS:

Authors	**Title**	**Publishers**
SB Arora	Hand Book of Bakery Products	SIRI
Matz	Bakery Technology and Engineering	AVI

FT-2205 TECHNOLOGY OF MEAT, FISH AND POULTRY

L T P **Sessional Marks: 25**
2 1 0 **End Term Examination Marks: 50**

Unit I

Introduction : Definition; status and scope of meat, fish and poultry processing industry in India

(04 Hrs)

Egg : Structure and composition; egg quality; grading; preservation and storage

(05 Hrs)

Unit II

Meat : Sources of meat; structure, types and composition of muscle, connective tissues; conversion of muscle into meat, postmortem changes

(09 Hrs)

Unit III

Properties of fresh meat & its preservation : Color characteristics, curing, smoking, freezing, canning and pickling

(09 Hrs)

Unit IV

Poultry : Kind of poultry; different types of slaughtering methods; singeing; evisceration; washing; cooling and storage

(05 Hrs)

Fish : Classification of fishes; composition, processing, preservation and spoilage of fresh fish

(04 Hrs)

RECOMMENDED BOOKS:

Authors	**Title**	**Publishers**
Lawrie	Meat Science	CBS
Stadelman	Egg Science and Technology	
Borgstron.	Fish as Food. Vol. I to IV	AP

HU 1101/1201 COMMUNICATION SKILLS

L T P **Sessional Marks:25**
2 1 0 **End Term Exam Marks:50**

UNIT - I

TEXTUAL EXERCISES: Exercises in Comprehension, Vocabulary and Composition

(10 Hrs)

UNIT-II

GRAMMAR: Textual Review of usage of Tenses, Articles and Narration

(8 Hrs)

UNIT-III

CORRESPONDENCE: Official, Business and Personal Letters

(8 Hrs)

UNIT-IV

WRITING SKILLS: Précis writing exercises, Drafting Invitations, Advertisements, Reporting events

(8 Hrs)

TUTORIALS: Using the Library, Declamations & Debates, Conversation Practice

(8 Hrs)

RECOMMENDED BOOKS

Title	**Author**	**Publisher**
Brush Up Your English	J.D.Murthy	Book Palace
English Grammar & Composition	Wren & Martin	ELBS
A Course in Written English	Narayanswami	Orient Longman

HU 2101/2201 E.D.P.

L T P
2 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 25

UNIT-I

Introduction to entrepreneurship, Meaning, Concept, Scope of entrepreneurship, qualities of an entrepreneur, problems faced by Indian entrepreneurs, Role of banks& financial institutions in the development of small scale industries (7 Hrs)

UNIT-II

Communication, Communication process, Barriers to effective communication and communication channels, Effective communication, Motivation, Meaning, Motivating and demotivating factors, Abrahm, Mastow's need hierarchy model, Theory X & Theory Y of motivation. (6 Hrs)

UNIT-III

Marketing management & Marketing Mix, Leadership and qualities of a successful leader (8 Hrs)

UNIT-1V

Responsibilities of Professional Manager, Basic functions of Management viz. planning, organizing, directing & controlling (6 Hrs)

Recommended Books:

Title	**Author/Publisher**
Management	Stephen P. Robbins, Mary (Pearson Education Asia)
Management	Stephen P.Robbins, Mary (Pearson education Asia)
Entrepreneurship New venture creation	David H.Holt, PHI
Entrepreneurship & small Business Management	Nicholas, Siropholis, Haughton Mifflin Company, Boston-Newyork
Entrepreneurship development of India	C.B.Gupta/Sultan chand & sons

IE-1101 BASIC ELECTRONICS ENGINEERING & ELECTRICAL CIRCUITS

L T P **Sessional Marks: 25**

3 1 0 **End Semester Examination Marks : 75**

Unit – I

Introduction : Classification of materials into conducting, semi-conducting and insulating materials through a brief reference to atomic structure, conducting materials, insulating materials, magnetic materials.

(04 Hrs)

Electrical Circuit Analysis: Concept of duality of voltage and current sources, nodal and mesh analysis, star-delta conversion, Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum Power Transfer theorem.

(08 Hrs)

Unit – II

Active and Passive Components : Introduction to active and passive component, fixed and variable resistance, their various types, fixed and variable capacitors, their various types and important specifications and color codes, Voltage and current sources, concept of constant voltages and constant current sources, symbol and graphical representation, characteristics of ideal and practical sources.

(12 Hrs)

Unit – III

Semiconductor Diode : Atomic structure of Germanium and Silicon semi-conductors, intrinsic and extrinsic semiconductors, PN junction, basic principles of operation and VI characteristics of PN junction diode, static and dynamic resistance of a diode. Use of a diode in rectifiers, half wave, full wave and bridge rectifier with shunt capacitor filer, series inductor filter, zener diode and its applications as a voltage regulator, light emitting diode (LED), Liquid crystal display (LCD).

(12 Hrs)

Unit – IV

Transistor : Introduction to a transistor, working of a pnp and npn transistor, input and output characteristics, transistor configuration, biasing of a transistor, amplifying action of a transistor, comparison of different configurations, common emitter amplifier circuit, load line concept, field effect transistor, FET, JFET, MOSFET, their characteristics and applications, uni-junction transistor (UJT).

(12 Hrs)

RECOMMENDED BOOKS :

Title	Author	Publisher
Text Book		
Principle of electrical & electronics Engg	J.S. Dhillon	Kalyani
Reference Books		
Electrical Technology vol-I and vol-IV	B. L. Thareja	S. Chand Publications
Electronic principles	S K Sahdev	Dhanpat Rai & Sons
Electronic components and materials	Grover and Jamwal	Dhanpat Rai & Sons
Electronic components and materials	S M Dhir	TMH
Electronic devices and linear circuits	Bhargava & Gupta	TMH
Basic electronics	V K Mehta	S Chand and Co

IE-1102 BASIC ELECTRONICS ENGINEERING

L T P **Sessional Marks: 25**
2 0 0 **End Semester Examination Marks : 25**

Unit – I

1 **Introduction** **8 hrs**

Classification of materials into conducting, semi-conducting and insulating materials through a brief reference to atomic structure, conducting materials, insulating materials, magnetic materials

Unit – II

2 **Active and Passive Components** **8 hrs**

Introduction to active and passive component, fixed and variable resistance, their various types, fixed and variable capacitors, their various types and important specifications and color codes, Voltage and current sources, concept of constant voltages and constant current sources, symbol and graphical representation, characteristics of ideal and practical sources

Unit – III

3 **Semiconductor Diode** **8 hrs**

Atomic structure of Germanium and Silicon semi-conductors, intrinsic and extrinsic semiconductors, PN junction, basic principles of operation and VI characteristics of PN junction diode, static and dynamic resistance of a diode. Use of a diode in rectifiers, half wave, full wave and bridge rectifier with shunt capacitor filer, series inductor filter, zener diode and its applications as a voltage regulator, light emitting diode (LED), Liquid crystal display (LCD)

Unit – IV

4 **Transistor** **8 hrs**

Introduction to a transistor, working of a pnp and npn transistor, input and output characteristics, transistor configuration, biasing of a transistor, amplifying action of a transistor, comparison of different configurations, common emitter amplifier circuit, load line concept, field effect transistor, FET, JFET, MOSFET, their characteristics and applications, uni-junction transistor (UJT)

RECOMMENDED BOOKS

	Title	Author	Publisher
Text Book			
1.	Principle of electrical & electronics Engg	J.S. Dhillon	Kalyani
Reference Books			
2.	Electronic principles	S K Sahdev	Dhanpat Rai and Sons
3.	Electronic components & materials	Grover & Jamwal	Dhanpat Rai & Sons
4.	Basic electronics	V K Mehta	S Chand and Co

IE-1201 ELECTRICAL MEASUREMENTS AND INSTRUMETATION

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit – I

Introduction : Elements of generalized measurement system, characteristics of instruments, accuracy, precision, sensitivity, range, span.

(08 Hrs)

Unit – II

Basic Indicating Instruments : Classification of analog instruments, concept of deflecting, controlling and damping torque, construction and principle of moving iron and moving coil instruments, construction of ammeter and voltmeter and extension of their range.

(08 Hrs)

Unit – III

Cathode Ray Oscilloscope (CRO) : Construction and working of CRT, block diagram of a CRO, measurement of voltage and frequency with CRO.

(08 Hrs)

Unit – IV

Bridges : Wheatstone Bridge, for Resistance Measurement, Macwells Inductance Bridge for Induction Measurement, De Sauty Bridge for capacitive measurement, Weins bridge for frequency measurement, LCR meter, Insulation tester.

(08 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Book		
Electrical and electronics measurements & instrumentation	A K Sawhney	Dhanpat Rai and Sons
Reference Books		
Electrical measurement	J B Gupta	S K Kataria and Sons
Electronic instrumentation & measurement techniques	W D Cooper	PHI

IE-2101 HUMAN PHYSIOLOGY

L T P
2 1 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit – I

Introduction : Human body, cells, Tissues, blood compositions, blood group RBC, WBC, DNA, GENES.

(04 Hrs)

Digestive system: Organs for digestive system, mouth, stomach, small intestine, large intestine, pancreas, liver.

(08 Hrs)

Unit – II

Respiratory system : Lungs, types of respiration, measurement of respiration rate, ventilation, gas exchange, mechanism in lungs, lung volume capacities.

(06 Hrs)

Urinary System : Kidneys, ureters, urinary bladder, uretha.

(06 Hrs)

Unit – III

Cardiovascular system: Introduction to Cardiovascular system, heart structure, electrocardiogram, flow of blood through heart, blood pressure.

(12 Hrs)

Unit – IV

Nervous system : Anatomy of nervous system, neurons, neural communication, brain, spinal cord.

(12 Hrs)

RECOMMENDED BOOKS:

Title	**Author**	**Publisher**
Text Book		
Human Physiology	A.K Jain	Arya Book Depot
Reference Books		
Biomedical (for class XI and XII)	N J Chinoi	NCERT
Biomedical instrumentation and measurements	L Cromwell	PHI
Anatomy and Physiology	Waugh and Grant	Elsevier

IE-2102 ANALYTICAL INSTRUMENTATION

L T P
2 1 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit – I

pH meter : Purpose, basic principle and block diagram, practical application, troubleshooting chart and precautions to be taken.

(02 Hrs)

Spectro photo- meter : Purpose, basic principle and block diagram, practical application, troubleshooting chart and precautions to be taken.

(10 Hrs)

Unit – II

Blood flow meter : Basic principle and block diagram of electromagnetic flow-meter and ultrasonic blood flow-meter.

(06 Hrs)

Blood gas analyzers : Blood pH measurement, measurement of blood, PCO2, blood PO2, measurement, block diagram of complete blood gas analyzer.

(06 Hrs)

Unit – III

Blood cell counters: Methods of cell counting, culture counting.

(06 Hrs)

Respiratory function analyzers : Respiratory function, measurement, spiro-metry, respiratory function, analyzers, respiratory gas analyzer, oxy-meter.

(06 Hrs)

Unit – IV

Audio meter : Basic block diagram of audiometer, speech audiometer, block diagram of different types of audiometers.

(06 Hrs)

Centrifuge machine: Purpose, basic principle and block diagram, practical application, troubleshooting chart and precautions to be taken.

(06 Hrs)

RECOMMENDED BOOKS :

Title	**Author**	**Publisher**
Text Book		
Biomedical instrumentation and measurements	L Cromwell	PHI
Reference Books		
Handbook of biomedical instrumentation	R S Khandpur	TMH
Handbook of Analytical instrumentation	R S Khandpur	TMH

IE-2103 SENSORS AND TRANSDUCERS

L T P
2 1 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit – I

Introduction : Definition, Need and position of transducer in measurement system, Classification based on Primary and secondary transducers, Active and passive transducers, Analog and digital transducer, transduction principle. Transducer description, General transducer characteristics.

(12 Hrs)

Unit – II

Resistive transducers: Principles of operation of Potentiometers, Resistance temperature detector, thermistors, Metal and semiconductor strain gauges. Applications.

(12 Hrs)

Unit – III

Inductive transducers: Different principles-variation in self inductance, mutual inductance, production of eddy currents, different types based on these principle and their uses, construction and principle of operation of LVDT, applications of LVDT advantages and disadvantages of LVDT.

(12 Hrs)

Unit – IV

Capacitive transducers : Different principles- variation in di-electric constant, area of overlapping of plates, distance between plates, different types based upon these principles, uses of capacitive transducers for measurement of angle, displacement, level and humidity, advantages and disadvantages of capacitive transducers.

(08 Hrs)

Optical transducers : Photo-emissive, photoconductive, photodiodes and phototransistors. Applications.

(04 Hrs)

RECOMMENDED BOOKS

Title	**Author**	**Publisher**
Text Book		
Electrical and electronics measurements & instrumentation	A K Sawhney	Dhanpat Rai and Sons
Reference Books		
Instruments and measurements	S K Kumar	Dhanpat Rai and Sons
Electronic instrumentation and measurement techniques	W D Cooper, A D Helfrick	PHI
Instrumentation, measurement and Analysis	Nakra & Chaudhry	TMH

IE-2104 BIOMEDICAL EQUIPMENT & SIGNAL MEASUREMENT

L T P
2 1 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit – I

Bio Electric Signal and Electrodes : Origin of bioelectric signals, recording electrodes, silver-silver chloride, electrodes, electrodes for EEG, ECG, EMG, electrical conductivity of Electrode Jellies and creams, micro electrode.

(12 Hrs)

Unit – II

Biomedical Recorders : Block diagram & description of Electro cardio graph, ECG Leads, Bipolar leads, Unipolar leads, Block diagram & description of Electro encephalograph (EEG), 10-20 Electrode System, Electromyograph (EMG).

(12 Hrs)

Unit – III

Patient Care & Monitoring : Origin of bioelectric signals, recording electrodes, skin-contract-impedance, electrodes of ECG, electrodes for EEG, electrodes for EMG, electrical conductivity of electrode jellies and creams, micro-electrodes.

(12 Hrs)

Unit – IV

Therapeutic Equipments : Introductions to Diathermies (Short wave and surgical), radio therapy equipment, Ultrasonic therapy units, Magnetic resonance imaging.

(06 Hrs)

Electrical safety of medical equipment: Physiological effects of electrical currents, shock hazards from electrical equipment, methods of accident of accident prevention.

(06 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Book		
Handbook of biomedical instrumentation	R S Khandpur	TMH
Reference Books		
Biomedical instrumentation and measurement	L Cromwell	PHI
Instrumentation handbook	Considine	TMH

IE-2201 INTEGARATED CIRCUITS

L T P
2 0 0

Sessional Marks : 25
End Term Examination Marks: 25

Unit – I

Integrated circuits (ICs) : Definition, Monolithic and hybrid, types, Design of discrete components, Advantages of ICs over discrete components, Integration types- SSI, MSI, LSI.

(04 Hrs)

Power amplifier : Amplifier types and their operation, Working of linear IC audio amplifier(CA3018).

(04 Hrs)

Unit – II

Operational amplifiers: Characteristics- ideal, inverting, non-inverting inputs, virtual ground, Applications- Comparator, inverter, adder, subtractor, phase shifter, differentiator, integrator, inverting, non-inverting amplifier.

(08 Hrs)

Unit – III

555 timer: Simple block diagram, pin configuration, 555 as a mono stable and a-stable multi-vibrator, applications.

(08 Hrs)

Unit – IV

Voltage regulators : Working of 78xx and 79xx series IC regulators, pin configuration and use in power supply , Adjustable voltage regulators-LM318, 7236.

(08 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Book		
Modern digital electronics	R P Jain	TMH
Reference Books		
Digital computer design	Morris Mano	PHI
Integrated electronics	Millman & Halkias	TMH
Digital electronics and computer	Malvino	PHI
Principle of electronics	Albert Paul Malvino	TMH

IE-2202 DIGITAL ELECTRONICS

L T P
2 1 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit – I

Introduction : Basic difference between analog & digital signal, Applications & advantages of digital signals.

(06 Hrs)

Number system : Binary and hexadecimal number system- conversion from decimal and hexadecimal to binary and vice versa, BCD representation, Binary addition, subtraction and 2's complement method of addition/ subtraction.

(06 Hrs)

Unit – II

Logic gates: Concept of negative and positive logic, Definition symbols and truth table of NOT, AND, OR, NAND, NOR, EXOR gates, NAND and NOR as universal gates.

(06 Hrs)

Latches and flip- flops: Concept and types of latches with their working and applications, Operation using waveforms and truth tables of RS, T, D, JK master/ slave JK flip- flops, Difference between a latch and a flip-flop.

(06 Hrs)

Unit – III

Counters: Binary counters, Divide by N ripple counters, decade counter, Preset table and programmable counters, Down counter, up/ down counter, Synchronous counters (introduction only), Difference between asynchronous and synchronous counters.

(12 Hrs)

Unit – IV

Shift register: Introduction and basic concepts including shift left and shift right, Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.

(06 Hrs)

Introduction to microprocessor: Architecture of 8-bit microprocessor, simple programming techniques/ memories related to microprocessor.

(06 Hrs)

RECOMMENDED BOOKS:

Title	**Author**	**Publisher**
Text Book		
Digital electronics	B.P Singh	Dhanpat Rai
Reference Books		
Digital computer design	Morris Mano	PHI
Integrated electronics	Millman & Halkias	TMH
Digital electronics and computer	Malvino	PHI

IE- 2203 MAINTAINANCE OF BIOMEDICAL EQUIPMENT

L T P
2 1 0

Sessional Marks : 25
End Term Examination Marks: 50

Unit – I

Reliability: Reliability aspect of medical electronic equipment, factors effecting reliability of equipment, causes of failures, MTBF, MTTF, MTTR.

(12 Hrs)

Unit – II

Types of Maintenance: Availability and need for maintenance of medical equipment, maintenance organization, preventive maintenance, predictive and breakdown maintenance and their procedures, examples of maintenance schedules, maintenance manuals and manufacturer's instructions.

(12 Hrs)

Unit – III

Spares: Classification, cataloguing and codification of spare and consumables, ordering and stocking of spare parts for equipment.

(04 Hrs)

Testing of Electronic Components: Introduction to Electronic Test Instrument like Multimeter, Oscilloscope, Function generator, signal generator, RLC meter, Logic analysers Logic probe etc. Test procedures of resistance, capacitors, inductors, transformers, diodes, transistors, ICs etc.

(08 Hrs)

Unit – IV

Maintenance of different biomedical equipment: Preventive maintenance of electrodes for bioelectric recordings; preventive, predictive and breakdown maintenance of 3 lead analog ECG machine, 12 lead analog and computerized ECG machine, X-Ray machine, CT scan machine, MRI machine, dialysis machine, ventilator, respirators, pace makers, defibrillators, heart lung machine.

(12 Hrs)

RECOMMENDED BOOKS:

Title	**Author**	**Publisher**
Text Book		
Introduction to biomedical equipment technology	Carr and Brown	Pearson Education
Reference Books		
Industrial maintenance management	S K Shrivastava	S Chand and Co
Maintenance of electronic equipment	K S Janwal	Dhanpat Rai & Sons
Handbook of biomedical instrumentation	R S Khandpur	TMH

ME-1101 WORKSHOP TECHNOLOGY-I

L T P
2 0 0

Sessional Marks: 25
End Term Examination Marks: 25

Unit I

Carpentry : Introduction, soft and hard wood, selection of timber, seasoning of timber, carpentry tools and operations, wooden joints.

(08 Hrs)

Unit II

Welding : Introduction, welding processes-arc & gas welding, their applications, advantages & limitations. Equipment used in arc & gas welding, types of welded joints, soldering & brazing & their applications

(08 Hrs)

Unit III

Foundry : Advantages of casting & its limitations, elementary casting procedure, Foundry hand tools, types & properties of moulding sand, ingredient of moulding sans, pattern making, mould making, cores & core making, common casting defects.
Sheet Metal : Tools & Equipment used, shearing & bending machines, types of sheet metal Joints & their applications

(08 Hrs)

Unit IV

Fitting : Equipment used in fitting shop, vices, surface plate, try square, bevel squares, Combination set, different files & their purposes, hacksaw, hammers, calipers & Dividers, taps, drills, fillets & radius gauges. Use of vernier caliper & micrometers.

(08 Hrs)

Recommended Books:-

Title	Author	Publisher
	Text	
Production technology	PC Sharma	S Chand Publishers
	Reference	
Workshop technology (Vol.1)	T L Chaudhary	Khanna Publishers.
Workshop technology (Vol. I)	Raghuwanshi	Dhanpat Rai

ME-1202 BASIC THERMODYNAMICS

L T P
2 1 0

Sessional Marks: 25
End Semester Examination Marks : 50

UNIT I

Introduction

Boyle's Law, Charle's Law, characteristics gas equation, universal gas constant Properties; intrinsic and extrinsic, system; open, closed and isolated, surrounding, Thermodynamic equilibrium (12 Hrs)

UNIT II

Laws of thermodynamics

Zeroth law of thermodynamics, first law of thermodynamics, concepts of enthalpy, internal energy, specific heat, work and heat, concept of entropy, clauses and Kelvin plank statement of second law of thermodynamics, Throttling and free expansion, non-flow work done under isothermal, polytropic, adiabatic, isobaric, isochoric processes (12 Hrs)

UNIT III

Formation of Steam and Steam Boilers

Steam formation, wet steam, dry steam and saturated steam, dryness fraction, superheated steam; degree of superheat, latent heat of vaporization, Enthalpy of steam, Boiler Locomotive, Babcox- Willcox (12 Hrs)

UNIT IV

I.C Engine and Cycles

Types, classification, CI and SI engines, Mechanical constructional details of two stroke petrol engine and diesel engine, four stroke petrol and diesel engines (12 Hrs)

Recommended Books:

Title	**Author**	**Publisher**
	Text	
Thermal Engg	R. K. Rajput	Laxmi publication
	Reference	
Heat and Thermodynamics	PL Ballany;	Khanna Publisher
Thermal Science	Domkundwar	S.Chand Publishers
Heat Engineering	Kumar and Vasandani	S.ChandPublications
I. C. Engine	Ganesan	McGraw Hill

ME-2101 ENGINEERING MATERIALS

L T P
3 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 50

Unit I

Introduction : Classification of Engineering materials, metals and non-metals. Mechanical, Thermal and Electrical properties of metals. Elastic deformation of metals (Introductory). Plastic deformation of metals (Introductory). (12 Hrs)

Unit II

Ferrous Metals : Pig Iron, Cast Iron, Wrought Iron. Carbon Steels. Constituent elements, Properties and applications of above Ferrous metals applications of above Ferrous metals. (12 Hrs)

Unit III

Non-Ferrous Metals : Introduction to Aluminum and Its alloys. Introduction to Copper and Its alloys. Introduction to Lead and Its alloys. Introduction to Tin and Its alloys. Introduction to Zinc and Its alloys. Copper-Tin alloys. Composition, properties and applications of non-ferrous metals (12 Hrs)

Unit IV

Non-Metals : Introduction to Plastics. Ceramics, Glass, Abrasives, Insulating Materials. Their properties and applications. (12 Hrs)

Recommended Books

Title	Author	Publisher
	Text	
Workshop Technology (Vol I)	Hazra-Chaoudhary	Media Publishers
	References	
Production Technology	P.C. Sharma	S. Chand
Material Science	O. P. Khanna	S. Chand

ME-2102 WELDING TECHNOLOGY-1

L T P
3 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 50

Unit I

Introduction : Introduction of welding as compared to other methods of fabrication, advantages and disadvantages of welding process. Classification of welding processes.

Welded Joints : Welded Joints: Types of welds and welded joints, edge preparation for different thicknesses, welding position.

(12 Hrs)

Unit II

Gas welding : Principle of gas welding, various gases used for gas welding, types of flames and their application. Gas welding equipments, cylinders and their specifications, construction and types of regulators and welding torch. Construction and working acetylene gas generator. Filler metals and fluxes.

(12 Hrs)

Unit III

Manual Metal Arc Welding : Definition, principle and applications. Welding arc and methods of its initiation. Welding power source, types and specifications. Concept of duty cycle and static characteristics. Concept of polarity, welding variables. Welding electrodes, specifications and coding system. AWS and BIS. Function and types of electrodes covering.

(12 Hrs)

Unit IV

Resistance Welding : Principle of resistance welding, spot welding, seam welding, projection welding, flash and butt welding. Limitations and applications of different welding processes.

Soldering and Brazing : Definition, basic difference between soldering, brazing and braze welding, various methods of soldering and brazing. Commonly used soldering and brazing filler materials and fluxes. Applications of brazing and soldering.

(12 Hrs)

Recommended books:

Title	Author	Publisher
	Text	
Welding Technology	Srinivasan	Khanna Publishers
	References	
Welding technology	O P Khanna	Dhanpat Rai
Modem arc welding	Nadkami	TMG

ME-2103 REPAIR AND MAINTENANCE OF WELDING EQUIPMENT

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Introduction : Introduction to various welding equipment, , Need of maintenance, types of maintenance corrective, preventive, breakdown, routing, condition based maintenance techniques, their explanation with suitable examples.

(08 Hrs)

Unit II

Maintenance of power sources : Introduction to power source, types of power source, AC transformer & DC rectifier, their constructional features trouble shooting & remedial action, development and implementation of the maintenance schedule.

(08 Hrs)

Unit III

Maintenance of welding equipment : Constructional features of the welding torches, and electrode holder used in GMAW, GTAW, SAW & SMAW processes respectively, maintenance of gas hoses and regulators in gas welding shop, handling and upkeep of the gas cylinders.

(08 Hrs)

Unit IV

Safety of welding equipment : Importance of safety, safety measures favorable to operator and equipment, safety measures for through maintenance of welding equipment, short circuiting and fire hazards, importance of site cleanliness.

(08 Hrs)

Recommended books:

Title	Author	Publisher
Text		
Welding technology	O. P. Khanna	Dhanpat Rai
References		
Welding processes and technology	R. S. Parmar	Khanna Publishers
Welding Trade Manual		TTTI Chennai

ME-2104 TOOL ROOM TECHNIQUES -I

L T P
3 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 50

Unit I

Jigs & Fixtures : Introduction to jigs & fixtures. Principles of jigs & fixtures design, location & principles of location, different elements of a jig, locating devices. Clamping, devices. jig bushes, drilling jigs. milling fixtures. turning fixtures.

(12 Hrs)

Unit II

Broaching : Introduction, types of broaches, classification, pull type & push type, horizontal & vertical pull type broaching machines.

(12 Hrs)

Unit III

Powder Metallurgy: Introduction, process of powder metallurgy, advantages & applications of powder metallurgy.

(12 Hrs)

Unit IV

Fitting Practice : Metal chipping & cutting, chipping tools, chipping techniques, scrapping, filing operations, cutting of external threads.

(12 Hrs)

Recommended books:

Title	Author	Publisher
	Text	
Workshop Technology(Vol-1)	Chapman	CBS
	Reference	
Production Technology	R. K. Jain	Khanna
Jigs & Fixtures	Gant	TMH
Workshop Technology Vol.I & II	Hajra Choudhary	Media Promoters
Workshop Technology Vol.I & II	B. S. Raghuvanshi	Dhanpat Rai

ME-2105 TOOL ENGINEERING

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Heat Treatment: Basic concepts, Iron-carbon equilibrium diagram. heat treatment- principle & applications. hardening. annealing. normalizing. case hardening, carburising. nitriding. tempering. hardness testing.

(08 Hrs)

Unit II

Cutting Tool Materials: Introduction. characteristics of cutting tool materials. Different types of cutting tool materials. cemented carbide tool bits.

(08 Hrs)

Unit III

Finishing Operations: Introduction, abrasive sticks & their types. die files, power hand polishing equipment. rotary files and mounted wheels.

(08 Hrs)

Unit IV

Geometry And Design Considerations Of Cutting Tools: Design considerations of single point cutting tool, types of single point cutting tools, type of chip beakers, Drill's nomenclature & construction, Milling cutters nomenclature & construction. Broach nomenclature & construction.

(08 Hrs)

Recommended books:

Title	**Author**	**Publisher**
	Text	
Workshop Technology(Vol-1)	Chapman	CBS
	Reference	
Manufacturing Processes	Begeman	John Willey
Workshop Technology Vol II	B. S. Raghuvanshi	Dhanpat Rai
Workshop Technology Vol.I & II	Hajra Choudhary	Media Promoters

ME-2109 AUTO ENGINEERING-I

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Introduction : General layout of vehicle: Scooter, car and tractor. Bodies and chassis of vehicles. Location and brief function of major assemblies like: Cooling system. Power system. Transmission system, Steering system. Suspension system, braking system. auto electrical system. (For Four wheelers)

Definition of following technical terms: - bore, stroke, clearance volume, swept volume, compression ratio, TDC, BDC, IHP, BHP, FHP

(08 Hrs)

Unit II

Engines : Type of Engines: Petrol engine, Diesel engine, CNG, Two strokes and four strokes engine, Single cylinder and multi cylinder engine, air cooled and water cooled engines.

Engine Components: cylinder block, cylinder head, piston, piston ring, gudgeon pin, connecting rod, crankshaft, bearing (main and big end), camshaft, tappets, push rod, rocker arm, valves, flywheels, oil pump, strainer, gas kit, circlip /cotters.. Working of 2-stroke and 4 stroke cycle engines- petrol and diesel. Concept of Euro Norms.

(08 Hrs)

Unit III

Fuel Injection System : Fuel Injection System: Fuel injection system, Types of Fuel injection system, Various components and brief description of Fuel injection system like, Fuel tank, Fuel filter, Feed pump, Primary and secondary filter, Fuel injection pump, Fuel line, Pipe, Fuel injector. AC fuel feed pump, Carburetor, Multipoint fuel injection

Lubrication System: Importance, types and main parts of lubrication system, crankcases, ventilation. Lubricant types and their grades.

(08 Hrs)

Unit IV

Electrical System : Lighting system (brief description and function of each part), fuse, electric horn circuit: meter set, temperature gauge, fuel gauge, speedometer/ Odometer, cable colour coding, wiper motor, indicators, starter, solenoid switch, ignition switch, Horn relay, battery, dynamo and alternator, hydrometer. Water level sensor, oil pressure switch.

(08 Hrs)

Recommended books:

Title	Author	Publisher
	Text	
Automotive mechanics	S. Srinivasan	TMH
	Reference	
Diesel engine mechanics	Mangal	TMH
Auto mobile engineering vol,1&2	Kirpal Singh	Standard.
Auto mobile Mechanics	Crouse	Mc Graw Hill.

ME-2110 FARM MACHINERY-I

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Introduction : Status of farm power in India, sources of farm power, Farm mechanization and its importance in the advancement of agriculture engineering/ technology, Categorization of farm machinery and equipment

Shaping and leveling equipments : Introduction, types, working principle, construction, mode of operation, specifications of scraper, riddger, leveller, bund former, soil scoop

(12 Hrs)

Unit II

Ploughing : Primary Tillage; introduction, types, working, principle, construction, mode of operation, specifications of Indigenous plough, mould board plough, disc plough, sub-soiler.

Secondary tillage: introduction, types, working principle, construction, mode of operation, specifications of cultivator, disc harrow, puddler, rotovator, brief introduction of hand hoe, wheel hoe.

(12 Hrs)

Unit III

Seeding equipments : Introduction, types, working principle, construction, mode of operation, specifications of; furrow opener, calibration of seed cum fertilizer drill, specification of different types of metering devices.

(12 Hrs)

Unit IV

Plant protection equipments : Introduction, types, working principle, mode of operation, specifications of sprayer and duster, foot operated, hand operated, power operated, hydraulic tractor drawn.

(12 Hrs)

Recommended books:

Title	**Author**	**Publisher**
	Text	
Principles of Farm Machinery	Kepner	C. B. S
	Reference	
Principles of agriculture engineering, Vol. I	Ohjha	Jain publishers
Hydraulic Machinery	Abdullah	Dhanpat Rai

ME-2111 MAINTENANCE OF FARM EQUIPMENT

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Introduction : Need for maintenance, breakdown maintenance, routine maintenance, corrective maintenance.

(08 Hrs)

Unit II

Preventive maintenance : Condition based maintenance and zero defects. Maintenance for safety, productivity and reliability.

(08 Hrs)

Unit III

Farm Equipment Maintenance : Possibilities of breakdowns in farm equipment, root cause analysis of these breakdowns and remedies for the breakdowns.

(08 Hrs)

Unit IV

Inspection, lubrication : Preventive maintenance checklist and preventive maintenance techniques applicable to farm machinery. Life-cycle cost and cost-effective maintenance.

(08 Hrs)

Recommended books:

Author	**Title**	**Publisher**
	Text	
Diagnostic Maintenance and condition monitoring	Kelly	EWP
	Reference	
Automobile Engineering Vol, 1& 2	Kirpal Singh	Standard
Principles of agriculture engineering, Vol. I	Ohjha	Jain publishers

ME-2112 FOUNDRY TECHNOLOGY-1

L T P
2 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 25

Unit I

Introduction : Role of manufacturing and various techniques; relevance of foundry process as dominating technologies. Characteristics. Properties and application.

(08 Hrs)

Unit II

Foundry : Outline and constituent of foundry technology; introduction to foundry industry, various foundry process their capabilities and application, safety requirement in foundry, Energy relevance of manufacturing with special reference to casting. Layout of foundry.

(08 Hrs)

Unit III

Moulding procedure: Concept of mould, constituents of flask equipment, riser, runner, pouring basin, sketching of moulds along with its component, types of mould; disposable, permanent, green sand, dry sand, moulding method. Need, function, type of pattern, BIS colour coding, materials and allowances.

(08 Hrs)

Unit IV

Moulding material Mould assembly: Function, properties of moulding sand, additives, natural and synthetic binding agent, classification based on applications. Assembly of cope and drag, chaplets, setting of cores, mould sealing, preservation of assembled moulds, bench life.

(08 Hrs)

Recommended books:

Title	**Author**	**Publisher**
	Text	
Principles of foundry technology	P. L. Jain	Khanna publishers
	Reference	
Foundry Technology	Shrinivasan	Khanna publishers
Foundry Technology	O. P. Khanna	Dhanpat Rai

ME-2114 BASIC REFRIGERATION AND AIR CONDITIONING

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Introduction : Meaning of refrigeration, concept of refrigeration. units of refrigeration. Dry ice refrigeration and refrigeration by using liquid gases, engine. refrigerator and heat pump. (08 Hrs)

Unit II

Simple Vapour Compression Refrigeration system Vapour compression refrigeration cycle, advantages and disadvantages of Vapour compression refrigeration system over air compression refrigeration system, COP of vapour compression refrigeration system. (08 Hrs)

Unit III

Psychrometry : Concept of air-conditioning and its requirement, composition of air vapour in air, dry bulb and wet 'bulb temperature, specific humidity, relative humidity, degree of saturation, absolute humidity, dew point depression specific volume of moist air, Daltons law of partial pressure, simple numerical problems, psychrometric charts, psychrometric process, simple numerical problem related to psychometric by psychometric charts and formulae. (08 Hrs)

Unit IV

Room air-conditioning : Constructional features & working of window type air conditioning & split type air conditioning, Concept of cooling loads. (08 Hrs)

Recommended Books:

Title	Author	Publisher
	Text	
Refrigeration and air conditioning	Domkundwar	Dhanpat
	Reference	
Air-conditioning designs hand book	Carrier Corporation	McGraw hill

ME-2115 REFRIGERATION & AIR CONDITIONING EQUIPMENTS

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Refrigeration compressors : Use of compressor in a RAC system, types and classification of compressors, constructional features and application of reciprocating compressor, rotary compressor and screw compressor, Hermatic and semi-hermatic compressor constructional features noise reduction and shock absorption. Centrifugal compressor, constructional features. operation and application, advantages and disadvantages of centrifugal compressor over reciprocating compressor (08 Hrs)

Unit II

Condensers : Function, types -air-cooled and water cooled, shell and tube type, shell and coil type, evaporators type condenser, applications, rating and selection of condenser, effect of failing an condenser. Expansion devices Function of expansion devices, different types of expansion devices -capillary tube automatic expansion valve, thermostatic expansion valve, low side float valve and high side float valve and their applications.
(08 Hrs)

Unit III

Evaporators : Classification of evaporators used in refrigeration and air-conditioning system, their function and application. (08 Hrs)

Unit IV

Refrigerant piping and water piping : Refrigerant piping, materials, choice of material for particular applications. Pipe-fitting and valves. (08 Hrs)

Recommended Books:-

Title	Author	Publisher
	Text	
Refrigeration and air conditioning	Domkundwar	Dhanpat
	Reference	
Air-conditioning designs hand book	Carrier Corporation	McGraw hill

ME-2116 INSTALLATION & SERVICING OF REFRIGERATION & AIR CONDITIONING EQUIPMENTS-1

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Units I

Installation of Refrigerator & Air Conditioner: Selection of type and capacity of Room air conditioner, location of A/C- window, indoor unit. Split A/C, availability of power, location of outdoor unit, piping layout, consideration of slope in window/split A/Cs, draining in indoor unit of split A/C, installation of piping.

(08 Hrs)

Units II

Servicing Tools : Use of servicing tools-vacuum pump; pressure testing kit, flaring tool set, tube bending kit, leak detecting kit. Brazing set, swaging tool, tube cutter, pinch off tool, charging lines, pressure gauges, gas cylinders, colour codes, service valve. General machine tools. (08 Hrs)

Units III

Fans and Blowers : Type and application of fans and blowers, fan rating and selection. (08 Hrs)

Units IV

Servicing : Need for servicing of condenser, evaporator (cooling), and fan motor.

(08 Hrs)

Recommended Books:

Author	Title	Publisher
	Text	
M. Adithan	Practical refrigeration and air conditioning	New age
	Reference	
R. K. Rajput	Refrigeration and air-conditioning	Kataria
Stocker.	Refrigeration and air-conditioning	McGraw hill Publication.
Carrier	Air-conditioning designs hand book	Corporation McGraw hill Publication.

ME-2117 WORKSHOP TECHNOLOGY-II

L T P
3 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 50

Unit-I

Turning : Principle of Operation, Description and main parts of lathe, specification of lathe, Lathe accessories, lathe operations-turning, facing, threading, parting off, grooving, taper turning, drilling, knurling, Selection of Cutting Parameters, Geometry of a single point cutting tool. Concept of capstan and turret lathe, their construction. (12 Hrs)

Unit II

Drilling : Principle of drilling operation, drilling machine and specifications, types of drills and holding devices, drilling operations-reaming, counter-boring, counter-sinking, spot facing, tapping, machining parameters-cutting speed, feed and depth of cut.

Boring : Principle of operations, boring machines and specifications, boring tools, boring bars. (12 Hrs)

Unit III

Milling : Principle of operation, classification of milling machines, up milling and down milling, milling operations-slab milling, face milling, form milling, gear milling, and types of milling cutters. (12 Hrs)

Unit IV

Shaping, Planning and Slotting : Introduction, brief description and construction of shaper, planner and slotter, Specifications and different operations, Types of tools. (12 Hrs)

Recommended Books:

Title	Author	Publisher
	Text	
Workshop Technology	H. S. Bawa	TMH
	Reference	
Production technology	PC Sharma	S. Chand Publishers
Workshop Technology (Vol-II)	Hazara and Chaudhary	Khanna Publishers.
Workshop Technology	P. M. Raghuvanshi	Kataria publishers

ME-2121 FORGING TECHNOLOGY-I

L T P
2 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 25

Unit I

Introduction : Role of manufacturing & various techniques; relevance of forging process as dominating technologies; characteristics, properties & applications. Safety requirements in forging.

(08 Hrs)

Unit II

Forging : Characteristics of forged components, concept of flow lines; importance of forging process & limitations.

(08 Hrs)

Unit III

Hand forging : Bending, cold forging & hot forging, role of heat, role of energy, component of hand forging equipment, forging application. Heating the job, effect of heat during the forging process & operation on the properties of material.

(08 Hrs)

Unit IV

Forging operations: Various forging operations (forging, forge welding, punching, shearing, fullering, drawing, upsetting, blocking, bending, trimming & shearing), types of furnace, forging die material-& properties, types of joints, type 9f die, past forging operations (coining, straightening, repair and stress relieving).

(08 Hrs)

Recommended Books:-

Title	**Author**	**Publisher**
	Text	
Metal forming	Nagpal	Khanna
	Reference	
Mechanical metallurgy	Dieter	McGraw Hill
Workshop Technology	Bawa	TMH

ME-2201 WELDING TECHNOLOGY-II

L T P
3 1 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 75

Unit I

TIG Welding: Principle and operation of TIG welding, power source and various shielding gases. Electrode materials. Advantages disadvantages and application.

(12 Hrs)

Unit II

MIG Welding: Principle and operation of MIG welding. Power source and various shielding gases. Welding variables, advantages, disadvantages and applications.

(12 Hrs)

Unit III

Submerged Arc Welding : Principle and operation of saw machine. Power source, filler wires and flux. Advantages disadvantages and applications.
Thermal Cutting: Oxygen cutting, oxy-acetylene cutting, arc cutting and gauging.
Surfacing: Purpose of surfacing, metal spraying methods, surfacing materials.

(12 Hrs)

Unit IV

Plasma Arc Welding : Principle and operation of plasma arc welding. Transferred and non- - transferred arc mode operation. Advantages and disadvantages and applications.
Welding of Plastics: Types if plastics, techniques used for welding of plastics.
Heat Treatment of Weldments : Weldability, introduction to thermal and residual stresses, longitudinal and traverse stresses, necessity of post weld heat treatment, annealing, normalizing, stress relieving.

(12 Hrs)

Recommended Books:

Title	**Author**	**Publisher**
	Text	
Welding technology	O. P Khanna	Dhanpat Rai
	Reference	
Welding processes and technology	R. S. Parmar	Khanna

ME-2202 INSPECTION AND TESTING OF WELDMENTS

L T P
2 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 25

Unit I

Welding Symbols : Basic welding symbols and their representation method.

(08 Hrs)

Unit II

Welding Defects : Classification of weld defects – Visual/Surface Defects, Subsurface Defects, the possible causes and their remedial measures.

(08 Hrs)

Unit III

Non Destructive Testing & Destructive Testing : Visual inspection (before, during and post welding) – liquid-penetrant, magnetic particle, eddy current, ultrasonic testing, radiography. Introduction to tensile, bend, impact, fatigue and hardness testing.

(08 Hrs)

Unit IV

Welding Procedure & Welder's Qualification : Introduction to welding procedure specifications, procedure qualification record, welder's performance qualification, PQR, WPS.

(08 Hrs)

Recommended books:

Title	**Author**	**Publisher**
	Text	
Welding Engineering and Technology	R. S. Parmar	Khanna
	Reference	
Welding Technology	Srinivasan	Khanna
Welding Technology	O. P. Khanna	

ME-2203 MANAGEMENT AND COSTING

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Introduction to management : Management concepts, hierarchy of management, managerial skills, management planning, characteristics of planning, planning steps, decision making.

(08 Hrs)

Unit II

Marketing and material management : Marketing management, marketing strategies, importance of consumer point of view in marketing, materials management concepts, material requirements, planning and inventory control.

(08 Hrs)

Unit III

Financial management and costing : Objectives and functions of financial management, cost accounting, cost control, elements of cost, prime cost, factory cost, total cost, selling price.

(08 Hrs)

Unit IV

Estimation : Importance of estimation, preparing realistic estimates methodology. Maintenance cost and repair cost estimation.

(08 Hrs)

Recommended books:

Title	Author	Publisher
	Text	
Production Management	A. P. Verma	Kataria
	Reference	
Management of systems	R. N. Nauhria	Dhanpat Rai
Industrial Engineering and Management	O. P. Mahajan	Dhanpat Rai

ME-2204 TOOL ROOM TECHNIQUES-II

L T P
3 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 50

Unit I

Processing of Plastics : Introduction, Plastics materials: thermoplastics & thermosetting plastics. Processing techniques like injection moulding, blow moulding, compression & extrusion process.
(12 Hrs)

Unit II

Rubber Processing : Introduction to rubber materials, rubber moulding processes, applications of rubber products.
(12 Hrs)

Unit III

Other Machining processes : Jig boring machine, ,jig grinding, sawing machine, working principle, types of tools used, job setting & accessories for these machines, super finishing processes.
(12 Hrs)

Unit IV

Basic concepts of New manufacturing processes : Electro discharge machining(EDM),operating principle, surface finish & machining accuracy, wire cut EDM, applications of EDM, electrochemical machining(ECM), principle, working & construction of ECM.
(12 Hrs)

Recommended books:

Title	**Author**	**Publisher**
	Text	
Production technology	R.K. Jain	Khanna
	Reference	
Tool engineering & Design	G. R. Nagpal	Khanna
Manufacturing processes	Begeman	John Wiley
Production Engineering	Pandey & Singh	S. Chand

ME-2205 TOOL AND DIE TECHNOLOGY

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Press working operations : Blanking, Piercing, Bending, Crimping, Notching, Coining, Punching, Slitting, Lancing, Nibbling, Drawing, Applications of press working operations.

(08 Hrs)

Unit II

Types of presses : Mechanical Press, Pneumatic Press, Knuckle-joint Press, Hydraulic Press, Fine blanking Press, Forging Press Hammers, specifications and their applications.

(08 Hrs)

Unit III

Types of dies : Progressive, combination, compound dies; their constructional features and specific applications, Strip layout concept.

(08 Hrs)

Unit IV

Parts of die Punch and die : Basic construction and parts of die, Die block , Punch plate, Blank punch, Pierce punch, Stripper plate, Pilot, Dowel, Back gage, Finger stops. Punch and die clearance, angular clearance and their material.

(08 Hrs)

Recommended books:

TITLE	AUTHOR	PUBLISHER
	Text	
Tool and Die making.	B. Singh	TMH
	Reference	
Production Engineering	P. C. Sharma	S. Chand
Tool design	Donaldson	TMH
Workshop Technology Vol.I & II	Hazra Choudhary	Media Promoters

ME-2206 PRINCIPLES OF METROLOGY

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Introduction : Basic concept of metrology, various classifications of measuring instruments, sensitivity, resolution, least count, errors in measurements, fundamental unit of length & its definition, length standards: line and end standards.
(08 Hrs)

Unit II

Marking Tools : Surface plate & its uses, marking punch, marking fluids (blue, $CuSO_4$, chalk power), height gauge, V-block, dividers, pointers, inside – outside spring calipers Vernier caliper, micrometer (internal & external), bevel protector, try square, combination square, plug gauge, snap gauge, ring gauge slip gauges, combination set, thread gauge, radius gauge, dial indicator, surface gauge.
(08 Hrs)

Unit III

Angular Measurements : Angle measurement by angle gauges, bevel protector, and sine bar.
(08 Hrs)

Unit IV

The Tools of the Toolmaker : V-block, tool maker's hammer, toolmaker's dial test indictor, die-maker's squares, toolmaker's button, toolmaker's clamps, edge finders, toolmaker's flat and high precision surface plates, engineer's parallels.

Recommended Books:

Title	**Author**	**Publisher**
	Text	
Engineering Metrology	R. K. Rajput;	Dhanpat Rai & Sons
	Reference	
Engineering Metrology	R.K. Jain	Khanna Publishers.
Production Engineering	P.C. Sharma;	S. Chand & Co. Ltd.

ME-2207 FINISHING OPERATIONS

L T P
2 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 25

Unit I

Emery papers/ cloth, hand grinding wheels: Different types- properties and uses of emery papers Like: coarse, finish. Super finish and water proof. Different shapes and sizes of grinding wheels- types of hand Grinding machines and their sizes.

(08 Hrs)

Unit II

Grinding paste and Needle files : Types of grinding paste and their characteristic- operational sequence of grinding paste- techniques of using grinding paste. Different types of needle files and their uses as per material specifications.

(08 Hrs)

Unit III

Surface roughness and Coatings : Grades of surface roughness and their value- symbol used for surface roughness- measurement of surface roughness. Powder coatings and its applications, graphite coating and its applications, spray coatings and its applications.

(08 Hrs)

Unit IV

Buffing and Electro- plating operations : Different types of pads, operation sequence of buffing operation, paste used for buffing. Nickel plating, chrome plating, silver and golden plating, Chemical etching.

(08 Hrs)

Recommended books:

Title	**Author**	**Publisher**
	Text	
Production technology	R.K. JAIN	KHANNA
	Reference	
Production engineering science	P.C. PANDEY	STANDARD PUBLISHERS
Workshop Technology, Vol I	Raghuwansi	Dhanpat Rai

ME-2208 AUTO ENGINEERING-II

L T P
3 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 50

Unit I

Transmission Systems: Necessity function and brief description of: Clutch- Types: Single plate. Multi plate; Components: Clutch plate. Pressure plate, Gear Box - Types: sliding mesh, constant mesh, transfer; Introduction to Epicycle gear box, Universal Joint and Slipjoint and Propeller shaft, Differential.

(08 Hrs)

Unit II

Steering System: Necessity, functions and brief description of: Steering wheel, Steering shaft, Steer (gear box types; worm and nut mechanism, worm and worm wheel, worm and earn, Knuckle arm, Tie rod, Drop arm, Track rod, King pin, Stub axle, Comber plate, Steering geometry: Toe-in Toe-out, King pin inclination, Dip stick, Camber, castor, Front axle, Introduction to collapsible steering.

(08 Hrs)

Unit III

Brake system: Necessity, functions and brief description of: Types of brakes: Mechanical, Hydraulic, Pneumatic Vacuum assisted Hydraulic brake, power brake, Main components: Tandem Master cylinder, master vacuum, Brake lining, Wheel cylinder, Retracting spring, Air compressor, Parking brake, Brake oil

Ignition system : Types- battery coil, magnetic system. Description and function of each part: battery, ignition coil, cam, capacitor, contact brake, point distributor rotor, spark plug, and magneto.

(08 Hrs)

Unit IV

Cooling system: Necessity, types (air and water cooling), brief description and functions of main pm1s like: radiator. water pump, thermostat, water houses, water, radiation from coolants and additives

Overhauling and fault Diagnosis: trouble shooting, defects, troubles, causes and remedies of the engine, clutch, gear box, universal joint, differential, rear axle, brake, steering, suspension, ignition system, cooling system, lubricating system, lighting system

(08 Hrs)

Recommended Books:

Title	**Author**	**Publisher**
	Text	
Automotive mechanic	S. Srinivasan	TMH
	Reference	
DieselEngineMechanic	Mangal	Mc Graw Hill
AutomobileEngineeringYol, 1& 2	Kirpal Singh	Standard
Automobile Mechanics	Crouse	Mc Graw Hill
I.C.Engines	Mathur and Sharma	Dhanpat Rai

ME-2209 FARM MACHINERY-II

L T P
3 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 50

Unit I

Planting Equipment : Introduction, types, working, construction, material adjustment, operation, maintenance, specifications of: Potato planters (semi auto and automatic) & Sugarcane planter, Multi-crop planter (cotton, Maize, sunflower, ground nut etc), Paddy transplanted, safety precautions in handling these equipments.

(12 Hrs)

Unit II

Harvesting equipment : Introduction, types, working, construction, material adjustment, operation, maintenance, repair specifications of: Sickle, Mower, Reaper, Ground nut Digger, Potato digger elevator, Tractor operated combine, Self propelled-Combine, Maintenance schedule of combine.

Threshing Equipment : Introduction, types, working, construction, material adjustment, operation, and specifications of: wheat thresher, groundnut decoricator, and paddy Thresher.

(12 Hrs)

Unit III

Processing equipment : Introduction, type, working, construction, material adjustment, operation, specification of: chaff cutter, hammer mill, sugarcane crusher, and rice huller.

Pumps : Introduction, types, working, construction, operation, installation (location, foundation, grouting), power requirement, troubleshooting, piping. Specifications of: Reciprocating (single and double acting), Centrifugal (and mono-block, submersible pump), Propeller pump, Introduction to Sprinkler and Drip irrigation.

(12 Hrs)

Unit IV

Tractor : Development of the tractors and functions of farm tractor, introduction to special feature of tractors such as: Body cooling system, steering system, transmission, final drive, clutch, PTO, hydraulic system, brake, hitching system tyre and front axle, starting and operation of tractor, repair, maintenance, common defects, few causes and their remedial measures.

(12 Hrs)

Recommended books:

Title	**Author**	**Publisher**
	Text	
Farm Machines & Equipments	C.P. Nagra	Dhanpat Rai.
	Reference	
Principles of Farm Machinery	Kepner	C.B.S.
Farm Tractors: Maint & Repair	Jain	T.M.H.
Hydraulic Machinery	Abdulla	Dhanpat Rai.

ME-2210 FOUNDRY TECHNOLOGY- II

L T P
3 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 50

UNIT-I

Core making: Definition and preparation of cores. Types of core, core sand and binders, core making and baking. Reinforcement of core. Painting and venting of cores, core boxes and core prints.

(12 Hrs)

UNIT-II

Melting: Classification of melting furnaces, Melting furnaces for AI, Lead, tin, brass, cast iron and steel and their alloys. Charge calculation, control and quality of metal fluxes etc. preparation of molten metal, handling of molten metal and metal pouring. Role of energy and energy conservation.

(12 Hrs)

UNIT-III

Special casting techniques : CO_2 process, die-casting, shell moulding, centrifugal casting, investment casting, slush casting, continuous casting and vacuum moulding.

Heat treatment of casting : Stress relieving, Annealing, Normalizing, Quenching and Tempering.

(12 Hrs)

UNIT-IV

Casting defects their causes and remedies : Mis-run, cold-shut, mismatch, blowholes, shrinkage porosity, cracks, scabs, pinholes, rattail, slag and non-metallic inclusion, possible causes of defects in casting and remedies thereof.

Fettling and cleaning Foundry mechanization: Shakeout and cleaning, removal of gates and risers, physical examination of casting.

(12 Hrs)

Recommended books

Title	**Author**	**Publisher**
	Text	
Principles of foundry technology	P. L. Jain	TMH
	Reference	
Foundry technology	Srinivasan	Khanna
Foundry technology	O. P. Khanna	Dhanpat Rai

ME-2211 FORGING TECHNOLOGY-II

L T P
3 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 50

Unit I

Forging process & equipments : Drop forging, study of forging process, mechanism of loading, mechanical, hydraulic, pneumatic forging hammers. Forging die, concept of constancy of volume, shape, role of flash gutter. Special forging process, roll forging, swaging, roll forming.

(12 Hrs)

Unit II

Close die forging : Advantages & disadvantages of close die, type of loading, hammer & press forging, concept of gradual loading, components & construction of closed forging die.

(12 Hrs)

Unit III

Forging defects and losses : Mismatch cracking fire cracks, scaling & oxidation, hand care ,tong mark, scale loss, shear waste, visual inspection, magna flux & ultra sonic testing.

(12 Hrs)

Unit IV

Flow lines and properties : Concept of properties, study of flow line, computation of stoke size, weight & cost, role of yield & economics.

(12 Hrs)

Recommended books:

Title	**Author**	**Publisher**
	Text	
Workshop Technology Vol.I	B. S. Raghuvansi	Dhanpat Rai
	Reference	
Materials and process of manufacturing	Degarmo	PHI
Workshop Technology Vol.I & II	Hazra Choudhary	Media Promoters

ME-2212 INSPECTION AND QUALITY CONTROL

L T P
2 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 25

Unit I

Inspection : Inspection, objectives of inspection, types of inspection.
Industrial inspection : Inspection of incoming material, in- process inspection, inspection of finished goods.
(08 Hrs)

Unit II

Quality : Definition of quality, total quality, model for total quality
Quality control : Quality control, total quality control, quality assurance, statistical quality control.
(08 Hrs)

Unit III

Quality control charts : Introduction to quality control charts for attributes and variables, advantages of using control charts.
(08 Hrs)

Unit IV

Introduction to TQM : Basic definition and features of TQM, characteristics of TQM.
(08 Hrs)

Recommended Books:

Title	**Author**	**Publisher**
	Text	
Statistical quality control	Mahajan	Dhanpat rai & Sons
	Reference	
Management of systems	R.N. Nauria	Dhanpat Rai & Sons

ME-2213 REPAIR AND MAINTENANCE

L T P
2 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks: 25

Unit I

Introduction to maintenance : Need for maintenance, Maintenance for safety, Productivity and Reliability.
(08 Hrs)

Unit II

Types of maintenance : Breakdown maintenance, Corrective maintenance, Routine maintenance, Preventive maintenance, Condition Based maintenance and zero defects.
(08 Hrs)

Unit III

Breakdowns in foundry furnaces and forging machines: Possibilities of breakdowns in foundry furnaces and forging machines, root cause analysis of these breakdowns and remedies for the breakdowns.
(08 Hrs)

Unit IV

Inspection and Application of Preventive maintenance technique : Inspection, fault finding, preventive maintenance techniques applicable to foundry furnaces , cranes and forging machines. Life-cycle and cost effective maintenance.

Recommended Books:

Title	**Author**	**Publisher**
	Text	
Diagnostic Maintenance & condition monitoring	Kelly	E WP
	Reference	
Industrial Engineering and Management	Mahajan	Dhanpat

ME-2214 APPLICATION OF REFRIGERATION AND AIR CONDITIONING

L T P
2 0 0

Maximum Sessional marks 25
Maximum End Term Examination Marks 25

Unit I

Food Preservation : Need of refrigeration in *food* preservation, Equipment used for food preservation in.

Domestic Applications: Refrigerator. Specifications and features of various refrigerators.

(08 Hrs)

Unit II

Commercial Applications: Introduction and application of deep freezers, display controls, ice cube machines. breweries dispensing machines etc.

Industrial Applications: Introduction and application of cold Storage, ice plants, ice cream machines, milk and vegetable storage cold room.

(08 Hrs)

Unit III

Comfort Air Conditioning : Requirements *for* comfort air conditioning (internal design conditions) Applications of:

-Desert cooler; its working and uses
-Window air conditioner: its working and uses
-Split air conditioner; its working and uses
-Package air conditioner; its working and uses
-Central air conditioning plant; its working and uses

(08 Hrs)

Unit IV

Portable Air Conditioning

- Car air conditioner
- Bus air conditioner
- Train air conditioner

(08 Hrs)

Recommended Books:

Title	**Author**	**Publisher**
	Text	
Basic refrigeration and air conditioning	Ananthanarayanan	McGraw Hill Publication
	Reference	
Handbook and Product Directory	ASHRAE	ASME
Electrical refrigerator and air-conditioning	Stocker	Mc-Graw Hill Publication
Refrigerator and air conditioning	Jordan	Prentice Hall of India.

ME 2215 INSTALLATION & SERVICING OF REFRIGERATION & AIR CONDITIONING EQUIPMENTS-II

L T P
3 0 0

Maximum Sessional marks : 25
Maximum End Term Examination Marks : 50

Unit I

Installation of packaged air conditioner : Location of indoor and outdoor unit of air-cooled packaged unit location of plant room of water-cooled packaged air conditioner. Piping layout electrical power supply and its distribution.

(12 Hrs)

Unit II

Ducting : Need of ducting, shapes of ducts. Material of insulation of ducts. acoustic lining layout of ducts -supplies and returns.

(12 Hrs)

Unit III

Installation of central air conditioning Plant : Selection of plant room set and layout of equipment. Servicing Need for de-scaling of condenser. Cleaning of AHU cooling, replacing of compressor oil, gas, gas level leakages. Pumps Use of pumps in RAC system, types of pumps. Selection of pump.

(12 Hrs)

Unit IV

Cooling towers and spray ponds : Functions and types: natural forced and induced draft. Makeup water and recalculated water.

(12 Hrs)

Recommended Books:

Author	**Title**	**Publisher**
	Text	
R. K. Rajput	Refrigeration and air-conditioning	Kataria
	Reference	
M. Adithan	Practical refrigeration and air conditioning	New Age
Stocker.	Refrigeration and air-conditioning	McGraw hill Publication.
Carrier	Air-conditioning designs hand book	Corporation McGraw hill Publication.

ME-2216 TROUBLE SHOOTING AND MAINTENANCE

L T P
2 0 0

Maximum Sessional marks: 25
Maximum End Term Examination Marks : 25

Unit I

Introduction to maintenance : Need for maintenance, Maintenance for safety, Productivity and Reliability.

(08 Hrs)

Unit II

Types of maintenance : Breakdown maintenance, Corrective maintenance, Routine maintenance, Preventive maintenance, Condition Based maintenance and zero defects.

(08 Hrs)

Unit III

Breakdowns in Refrigerators and Air Conditioners : Possibilities of breakdowns in Refrigerators and Air conditioners; Root cause analysis of these breakdowns and remedies for the breakdowns.

(08 Hrs)

Unit IV

Inspection and Application of Preventive maintenance techniques : Inspection, fault finding, preventive maintenance techniques applicable to refrigerators and air conditioners, centre plants. Life-cycle and cost effective maintenance.

(08 Hrs)

Recommended Books:

Title	**Author**	**Publisher**
	Text	
Diagnostic Maintenance and condition monitoring	Kelly	EWP
	Reference	
Basic refrigerator and air conditioning	Ananthanarayanan	McGraw HILL