

**SYLLABUS OF SLIET ENTRANCE TEST SET-IV
FOR ADMISSION TO DIPLOMA PROGRAMME, 2010 (Vertical Promotion)**

- Note:
1. In both the papers all the questions will be objective type with multiple choice. Answers of the objective type questions are to be filled in the OMR answer sheet given separately.
 2. There will not be any negative marking.

PAPER-I

Max. Marks: 100

Time: 2 hours

ENGLISH

Marks: 10 (10 Questions)

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| 1. Exercises in Grammar | 3. Idioms and Phrases |
| 2. Correction of sentences | 4. Change of Voice |

MATHEMATICS

Marks: 30 (30 Questions)

Algebra: Arithmetic progression, Geometric progression and Arithmetico-Geometric series. Series of natural numbers ($\sum n$, $\sum n^2$, $\sum n^3$). Mathematical induction. Permutations and Combinations. Binomial theorem for any index. Complex numbers. Algebra of complex numbers. Modulus and argument of a complex number. Conjugate of a complex number. Square root of a complex number. Cube roots of unity. De-Moivre's Theorem with simple applications.

Trigonometry : Trigonometric ratios and their relations. Trigonometric identities. T-ratios of allied angles. Addition and Subtraction formulae. Transformation of product into sum or difference and vice-versa. T-ratios of multiple and sub-multiple angles. Inverse Trigonometric functions. Solution of trigonometric equations.

Co-ordinate Geometry: Rectangular Cartesian coordinates. Distance between two points. Section formulae. Locus of a point. Equation of a straight line in various forms. Angle between two given lines. Condition for two lines to be parallel or perpendicular. Distance of a point from a line. Line through point of intersection of two given lines. Concurrency of lines. Equation of a circle in various forms including parametric forms. Intersection of a circle with a straight line. Equations of tangent and normal to a circle. Intersection of two circles. Equations of the parabola, ellipse and hyperbola in the standard forms & parametric form.

Calculus: Function, its domain and range. Limit, continuity and differentiability of a function. Derivative of sum, difference, product and quotient of two functions. Derivative of algebraic, trigonometric, exponential, logarithmic, hyperbolic and Inverse trigonometric functions. Chain rule. Derivative of functions expressed in implicit and parametric forms. Logarithmic differentiation, maximum and minimum values of a function. Equation of tangent & normals. Integration as the inverse process of differentiation. Integration by parts, by substitution and by partial fractions. Integration of rational and irrational functions. Definite integral and its application for the determination of area (simple cases).

PHYSICS

Marks: 30 (30 Questions)

Addition and subtraction of vectors, Scalar & vector product. Newton's Law of motion, conservation of energy & momentum, Inertial & gravitational mass, Equations of motion, concept of work, power and energy, Laws of friction, Methods of reducing friction. Circular motion, centripetal & centrifugal forces.

Universal Law of gravitation, Gravitational constant, acceleration due to gravity, mass of earth, variation in acceleration due to gravity of earth. Escape velocity, Orbital velocity.

Viscosity, sphere falling through a liquid, streamline flow, Reynolds number, Bernoulli's theorem, surface tension, rise of liquid in capillary tube.

Expression for pressure of a gas, Degree of freedom, mean free path, Ideal gas equation, specific heats of gases, Relation between C_p and C_v . Laws of thermodynamics, Reversible and Irreversible process, Absolute scale of temperature.

Simple harmonic motion, characteristics of S.H.M. Graphical description, simple pendulum. Coulombs Law, capacitors in parallel and series, Energy stored in capacitors, Ohms Law, Joules Law of thermal effects, thermoelectricity, Kirchoffs Laws. Magnetic flux, Magnetic force on a current carrying conductor, Faraday's law of induction, Lenz law, self and mutual inductance, Transformer.

CHEMISTRY

Marks: 30 (30 Questions)

Language of Chemistry: Chemistry and its branches, symbols, valency and formulae; elemental composition, empirical and molecular formulae, mole concept.

Atomic Structure: Rutherford's model, Bohr's Model, dual nature of matter, deBroglie's equation, uncertainty principle, quantum numbers, shapes of orbitals, Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of atoms.

Periodic Classification: Modern periodic table, arrangement of elements in the periodic table, classification into s, p, d and f block elements, periodic properties (ionisation energy, electron affinity, electronegativity, atomic and ionic radii).

Chemical Bonding : Ionic Bond: Definition, factors influencing the formation of ionic compounds, properties of ionic compounds, Covalent bond: Lewis concept, orbital concept of bond formation, sigma and pi bonds, hybridisation (sp , sp^2 & sp^3), structure of simple molecules, properties of covalent compounds. Coordinate-covalent bond.

Introduction of Organic Chemistry: Classification and nomenclature of organic compounds, saturated and unsaturated aliphatic hydrocarbons, preparation and properties with special reference to CH_4 , C_2H_6 and C_2H_4 . Aromatic hydrocarbons, benzene: structure, preparation and properties.

Oxidation & Reduction: Oxidation, reduction, oxidation number, redox reaction in terms of oxidation number, oxidation reduction as electron transfer process, balancing the redox reaction.

Chemical Equilibrium: Law of mass action, Le-Chatelier's principle and its applications, ionic equilibrium in aqueous solution, solubility product and common ion effect, Bronsted and Lowry concept of acids and bases, acid-base equilibria, pH, buffer solutions.

PAPER-II

Max. Marks : 100

Time : 2 Hours

CAC, CAF, CTD, CFF & CWG

Pattern of Paper : There will be 100 Objective Type Questions of 100 Marks. 50 Questions will be from common syllabus. Rest 50 Questions will be from the syllabus of the particular Branch.

Common to CAC, CAF, CTD, CFF & CWG

Marks: 50 (50 Questions)

Engineering Drawing: Geometrical construction: Point, Line, angle, Triangle, Quadrilateral, Polygon and Circle. Types of Lines: detailed description and uses of various types of lines. Orthographic projection: Orthographic projection of points, lines and solids. Isometric projection of the solids.

Workshop Technology: Welding: Introduction process of gas welding, arc welding, brazing and soldering. Equipment used and applications of these processes. Types of welding joint, welding defects and their remedies.

Foundry: Introduction of various casting processes, foundry tools and equipments, moulding sand, pattern and types of pattern, pattern allowances and materials, types of core, moulding procedures, melting techniques, molten metal pouring.

Sheet Metal: Tools and equipments used in sheet metal shop, sheet metal joints and their applications.

Fitting: Description and uses of various fitting tools and equipments: bench vice, files, hammers, scrapers, marking equipments, surface plate, V-block, scriber, callipers and punches.

Machine Tools: Principle of operation, construction features and operations carried on various machine tools; lathe, milling, drilling, planer, shaper and grinding machines.

Basic Thermodynamics: Introduction to Thermodynamics: Basic concept, thermodynamics properties, system, types of system, surrounding, and laws of thermodynamics, heat and work. Wet steam, dry steam and saturated steam, dryness fraction, superheated steam; degree of superheat, latent heat of vaporization, Enthalpy of steam, Locomotive Boiler, Babcox-Willcox Boiler. Introduction to I.C. Engines: Working of two strokes and four stroke engine, their working cycles.

CAC

Marks: 50 (50 questions)

Basic Refrigeration and air Conditioning: Definition and concept of refrigeration and air conditioning, principles of refrigeration and Air Conditioning, introduction of refrigerants and their selection, concept of COP, air refrigeration system (Bell Coleman, vapour compression cycle, vapour absorption cycle).

Refrigeration and Air Conditioning Applications: Introduction to cooling towers and water treatment plant, deep freezers and water coolers. Introduction to ice candy plants.

Trouble shooting and Maintenance: Unit functioning but not cooling, excessive power consumption, burning smell, not maintaining proper temperature and their remedies, frosted coil, tripping of system, abnormal noise and excessive vibration, preventive remedies, routine, break down, emergency. Records log books, consumption pattern for spares.

Refrigeration Equipment and Control: Compressor; Type, reciprocating, hermetic compressor, rotary compressor, centrifugal compressor, multistage compressor. Lubricating oils for refrigerating compressors. Condensers (air cooled and water cooled), evaporators (flooded and dry expansion only), secondary evaporators, expansion devices, pumps (reciprocating, rotary and centrifugal only).

Installation and Service Equipment: Introduction to installation of Air Conditioning system, symbols, codes and convention used. Testing for leakage, installation cost.

CAF

Marks: 50 (50 Questions)

Farm Machinery:

Categorizations of the farm machinery at large, operation wise, crop wise and season wise. Land shaping and levelling machines such as scrapers bound farmer (terracer) leveller; their description and importance.

Tillage equipment: Disk plough, mould board, plough, sub soiler, harrows and cultivators, their description, materials of construction, operational specification, operational adjustment.

Plant protection equipment: Introduction, importance and limitations of sprayers and dusters.

Inter culture equipment: Introduction description such as cultivators, earthing equipment such as furrower or ridger.

Transplanters: Descriptions of transplanters, potato planter, sugarcane planter.

Pumps: Description of the irrigation pumps, submersible pumps, PTO pumps used in agriculture, their principles of operation, trouble shooting of the pumps and its remedies.

Seed-cum-fertilizer drill: major faults and their remedies.

Combine harvester: Selection, precautions, loss at cutter bar, remedies, threshers and effective utilization, safety, precautions and their trouble-shooting.

Maintenance: Concept of maintenance, types of maintenance, lubricants; their types and uses.

Tractor and its power transmission, hydraulic system, paddy field peddler, post hole digger, groundnut decorticator, maize sheller.

Auto Engineering

General Layout of vehicle.

Major assemblies: Frame, engine brake, clutch, tyres, steering system, power transmission.

Engines: Types of engines, engine cycles, principles of operation of petrol/diesel, two stroke/four stroke, single cylinder/multi-cylinder engines.

Fuels and lubricants: Types, selection and properties.

Cooling system and lubricating system: Fuel system, intake and exhaust system, engine components, electrical system, ignition system, batteries, transmission system and brakes.

CTD

Marks: 50 (50 Questions)

Linear measurement: Linear callipers, micrometer, depth gauge, least count, angular measuring instruments.

Measurement and accuracy: Squareness, flatness, straightness, parallelism, surface plate, combination square, dial indicator, V-block, marking gauge.

Surface Texture: Machining symbol, surface roughness, waviness, surface finish.

Limits, fits and tolerances: Type of fits, tolerance, hole basis system, shaft basis system.

Geometry of single point cutting tool, drill and milling cutters.

Theory of machinability, tool life, effect of cutting parameters and geometry of tools on tool life, tool wear, cutting fluids, cutting tool materials.

Press working operations, cutting action in a die, progressive dies, combination dies and drawing dies.

Jigs and fixtures: Locating and clamping principles and elements, drill jigs, milling fixtures, turning fixtures.

Jig boring, jig grinding, sawing and broaching machines, super finishing processes.

CFF

Marks: 50 (50 Questions)

Foundry: Introduction, pattern materials, type of patterns, allowances for patterns, core boxes, core prints, moulding tools and equipment, moulding sand, types of moulding sand, sand additives, properties of moulding sand, sand preparation and sand testing, moulding process i.e. CO₂ process, shell moulding, investment casting, centrifugal casting, die casting. Use of chills, melting furnaces ladles, cleaning of castings, defects in casting.

Forging: Introduction, forging materials, heating devices, forging operations, power forging, power forging hammers i.e. spring hammer, pneumatic hammer and drop hammer, heat treatment of forgings.

CWG

Marks: 50 (50 Questions)

Introduction: Welding: definition, classification of welding and allied processes, introduction to different terms like parent metal, weld metal, HAZ, root, face, toe, reinforcement, ripples penetration welding speed and heat input.

Gas Welding: Principles of operation, various fuel gases, various types of flames, its characteristics and applications, advantages, disadvantages, applications. Basic principles involved in gas cutting.

Arc Welding: Manual metal arc-welding (MMAW) submerged arc welding (SAW). Gas tungsten arc welding (GTAW), gas metal arc welding (GMAW), Principles of operation, equipment used, welding parameters, advantages, disadvantages and applications of those welding processes.

Welding Metallurgy: Iron carbon equilibrium diagram, welding of steel, cast iron, aluminum.

Welding Defects: Various welding defects like under cut, lack of fusion, lack of penetration, overlap, slag inclusions, cold and hot cracking, porosity, arc strike and their causes and remedies.

Testing and Inspection of Weldments: Introduction, principle of operation, equipment and defects that can be detected by various NDT methods like visual inspection, liquid penetrate inspection, magnetic particles inspection, ultrasonic testing and radiography, introduction to tensile, hardness testing, impact testing and bend testing.

Joint Design and Welding Positions: Square butt, single-V, double-V, compound bevel, single-U, preparations and their relative merits. Different pipe and plate welding positions.

MODEL QUESTIONS:

Fill the choice of the alternative you think to the correct answer in the OMR answer sheet.

- Q.1 What type of line represents hidden details in the drawing of a machine?
 (a) broken (b) dotted (c) thick (d) thin
- Q.2 To check whether the compressor of the domestic refrigerator is working, one has to touch?
 (a) evaporator (b) condenser (c) compressor (d) none of these
- Q.3 The engine fitted with tractor is air cooled :
 (a) Escort (b) Swaraj (c) HMT (d) Eicher
- Q.4 Which of the following is not a fine finishing operation?
 (a) tumbling (b) lapping (c) buffing (d) honing
- Q.5 Which of these does not refer to defects in forging?
 (a) pitting (b) flakes (c) cold shuts (d) swell
- Q.6 A pool of parent metal is not used in arc welding.
 (a) MIG (b) Carbon (c) submerged (d) none of these

PAPER-II

Max. Marks : 100

Time : 2 Hours

CSMM & CMEE

Pattern of Paper : There will be 100 Objective Type Questions of 100 Marks. 50 Questions will be from common syllabus. Rest 50 Questions will be from the syllabus of the particular Branch.

Common for CSMM & CMEE

Marks: 50 (50 Questions)

Basic Electrical & Electronics Engineering: Ohm's Law, Kirchhoff's Laws, Series & Parallel D.C. circuits, Single-phase A.C., Power and Power factor, Conductors, Semi-conductors and insulators. Faraday's Laws of electromagnetic induction, self and mutual inductance, Fleming's left and right hand rule, Principles of A.C. and D.C. motor; transformers-working principle & uses, thermal & chemical effects of current.

Instrumentation: Basic elements of measurement system, accuracy, precision, sensitivity, linearity, resolution, hysteresis in measurement, basic information about errors, construction & working of moving coil and moving iron type instruments, ammeter, voltmeter, wattmeter and power factor meter, measurement of resistance (by V-I method and Wheatstone bridge), CRO-construction of CRT, measurement of voltage, current, phase and frequency using CRO.

CSMM

(Marks 50, 50 questions)

Introduction of Human Physiology, Physiological systems, Cells, muscles, respiratory system, digestive system, bioelectric signals and electrodes for ECG, EEG and EMG.

Spectrophotometer, measurement of heart rate, blood pressure, temperature and respiration rate, introduction to X-ray machine, cardiac pacemaker and defibrillators.

Basic AC bridges: Maxwell's Bridge, De-Sauty's Bridge & Wein's Bridge. Basic difference between analog and digital signals, binary number system, symbols and truth tables of logic gates, flip flops.

Network theorem, Thevenin's theorem, superposition theorem, Maximum power transfer theorem. Selection criterion of transducers, resistive, capacitive, inductive transducers & optical transducers.

Integrated circuits- Op-amp, 555 timer, IC regulator.

MODEL QUESTIONS:

Fill the choice of the alternative you think to be the correct answer in the OMR answer sheet.

- Q.1 Which of the following is not unit of flux?
(a) Maxwell (b) Weber (c) Tesla (d) All the above
- Q.2 Lungs are elastic bags located in a closed cavity called
(a) Pharynx (b) Larynx (c) trachea (d) thorax

CMEE

Marks: 50 (50 Questions)

Commonly used conducting and insulating materials, classification of insulators with respect to temperature, Electric shock and its effects, Precautions while working with electrical equipments, magnetic materials and their properties, magnetic circuits.

AC Fundamentals: Single phase, rms value, peak to peak value, average value, RL, RC & RLC circuits.

Basic principle and construction features of AC & DC electrical machines, concept of back emf & torque, types of DC motors (series and shunt) and their characteristics, speed control of DC motors, DC motor starters, single phase induction motor, 3-phase AC supply, star-delta connections.

Electric power generation, transmission and distribution system layout, types of cables.

Domestic wiring, wiring estimates, illumination schemes, conductor size, earthing, insulators, relay and circuit breakers, electrical Symbols, Conductor size calculation, fuses.

Non-conventional energy sources, energy conservation, layout of hydro and thermal power plant.

MODEL QUESTIONS:**Objective Type Questions:**

Fill the choice of the alternative you think to be the correct answer in the OMR answer sheet.

- Q.1 Which of the following is not unit of flux?
 (a) Maxwell (b) Weber (c) Tesla (d) All the above
- Q.2 In the case of three core flexible cable the colour of the neutral is :
 (a) Yellow (b) Brown (c) Black (d) Blue

PAPER-II

Max. Marks:100

TIME: 2 hours

CSME & CTV

Marks: 100 (100 Questions)

Basic Electronics: Introduction to conductor, insulator, intrinsic semi-conductor, extrinsic semi-conductor & their energy band diagrams. Working, VI characteristics, static & dynamic resistance of PN junction diode, Ripple factor, efficiency & working of halfwave & fullwave rectifiers. Working of inductor, capacitor, LC & pi filters, Diode clipper and clamper and clamper circuits & zener diode voltage regulator, Working principles and characteristics of transistors, Single stage transistor amplifier, Operation of tuned collector oscillator, Hartley oscillator, Collpit oscillator, Phase shift oscillator, Crystal oscillator, Working principle of FET & its characteristics.

Electronics Instruments: Construction, working and applications of voltmeter, ammeter, ohmmeter, CRO & applications of CRO.

Basic Communication: Introduction to Modulation & Demodulation, Amplitude modulation, Modulation index, side band frequencies & power contents in AM wave, frequency modulation and demodulation, essentials in frequency modulation, AM diode detector, AM radio receiver, stages of super heterodyne radio receivers.

Fundamentals of TV: TV transmission (Video & Audio), TV reception, Scanning, Flicker, interlaced scanning, aspect ratio. Composite video signal- Horizontal sync. detail, vertical sync. detail scanning sequence detail, channel bandwidth, vestigial side band transmission, monochrome picture tube, picture tube characteristics and picture tube control.

Audio & Video Systems: Characteristics of microphone, requirement for a good microphone, construction, working applications, advantages & disadvantages of a moving Coil microphone, Condenser microphone, Carbon microphone, Characteristics of Loud speakers – Construction, working, applications, advantages and disadvantages of moving coil Cone type and Electro-dynamic loudspeakers, Principle & Block diagram of Magnetic Recording & reproduction, Need & use of Public address system, Block diagram of PAS, requirement of a PAS, Basic concepts of Recording & reproduction of Video signal on tape, Rotating Heads, Need of Frequency Modulation for Video Recording.

Integrated Electronics: Operation amplifier, ideal Op-Amp, Op-Amp as summer, subtractor, differentiator, integrator, voltage follower & voltage comparator.

MODEL QUESTION:

Fill the choice of the alternative you think to be the correct answer in the OMR answer sheet.

- Q1 What is ripple factor of half wave rectifier:
 (a) 0.406 (b) 1.21 (c) 2.14 (d) none of these
- Q2 The number of sidebands in AM is:
 (a) 2 (b) 5 (c) 10 (d) infinite

PAPER-II

Max. Marks:100

CCA

TIME: 2 hours

Marks: 100 (100 Questions)

Fundamental of Computers : Block diagram of computer, CPU, memory, microprocessor, type of computer, BIOS: Purpose, power on self test (POST), Operating system classification: single user, multi-user, batch processing, time-sharing, real time operating system, multi-processing. Basics of 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, MS-DOS commands.

Principles of Digital Electronics : Difference between analog & digital signals, number system, Binary and hexadecimal no. system, conversion from decimal and hexadecimal to binary and vice versa, BCD representation, 2's complement method of addition, subtraction, Boolean algebra simplification using K map, truth table, symbols for NOT, AND OR, NAND, NOR, XOR gates.

Computer peripherals : Input devices, constructions and functions, storage devices, construction and types, output devices, like CRT, overview of Raster Scan, Various types of printers and their construction, working principles and common tenth, Primary and secondary storage devices.

C Programming : Introduction to high level and low level languages, compiler and interpreter, flowchart, algorithm and program development, Basic structure of C program, executing a C program, constants variables and data types, operations and their precedence, formatted I/O, control statements, Functions: function declaration, parameter passing, call by value, arrays.

Internet & Web Designing : Introduction to Internet, searching Internet through search engines like Yahoo, AltaVista, Different methods of Internet connectivity, File transfer through FTP, Remote login through Telnet, security issues. Planning a web site, promoting the web site, HTML Basics, working with color, fonts style sheets; working with images, frames, tables, linking pages, images, Web Authoring Tools: Front page.

Office Automation & Desktop Publishing Tools : Document creating, maintaining, and printing features available in MS-WORD. Creation of slides using simple text, templates, objects, tables and graph supporting features available in MS-Power point. Overview of desktop publishing (DTP)and exposure to various features of PageMaker and Corel Draw tools.

Database and Spreadsheets : Concepts of data and database, fields, records, models of databases (hierarchical, network and relational), Relational model, entities, attributes and relationships, database integrity rules, identifying primary and foreign keys in database. Creating database and tables in MS-Access, adding, modifying and deleting records in a datasheet. Querying records and retrieving data with respect to filter conditions, creating forms, reports and creating relation between different tables.

Creating worksheets, entering text data in worksheet, saving and retrieving worksheets, arithmetic operators and entering formulas in worksheet, Formatting worksheet, using available functions.

MODEL QUESTIONS

Fill the choice of the alternative you think to the correct answer in the OMR answer sheet.

Q1. What kind of hardware was used by first Generation Computers?

- a) Transistors b) Valves c) IC's d) SSI

Q2. How much conventional memory DOS uses for user Programmes and data?

- a) 1MB b) 384KB c) 640KB d) None of these

Max. Marks:100

PAPER-II

TIME: 2 hours

CFT

Marks: 100 (100 Questions)

Introduction to Food Science & Technology: Definition of food and food science; Classification and functions of food; Physico-chemical properties of foods. Food Adulteration.

Technology of Milk and Milk Products: Definition, composition and physico-chemical properties of milk; Milk reception operations: grading, sampling and testing of milk; Milk processing operations: preheating, filtration, clarification, pasteurization, sterilization, standardization, homogenization, and centrifugation; Technology of cream, butter and ice-cream.

Post Harvest Technology: General principles and equipments for cleaning, sorting, grading, size reduction, material handling and storage.

Principles of Food Processing & Preservation: Causes of food spoilage; General principles and equipments for drying and freezing; Canning, steps in canning; Chemical and radiation preservation.

Technology of Fruits & Vegetables: Fruits juice/pulp extraction technology; Preparation of jam, jellies, marmalades, pickles, chutneys, squashes; Preparation of tomato products such as tomato ketchup, soup, sauce, paste and puree.

Technology of Food Grains: Structure and composition of wheat, rice, corn and their types; Wheat milling operations: cleaning, conditioning, break and reduction system; Types of flour; Rice milling operations: cleaning, dehusking, polishing, grading, packaging; Dry milling of corn; Oil extraction methods; Milling of Pulses; Preparation of bread and biscuits.

Tech of Meat, Fish & Poultry: Structure of fish, egg and animal muscle; Rigor mortis and post-rigor changes; Egg quality; Meat and fish curing and smoking; Plant hygiene and sanitation.

Food Beverages: Types; Nutritional status; Processing technology of mineral water, tea and coffee.

Fundamentals of Microbiology: Prokaryotic and eukaryotic cells and cell organelles; Reproduction in Bacteria.

MODEL QUESTIONS

Fill the choice of the alternative you think to be the correct answer in the OMR answer sheet.

- Q.1. Egg is poor source of
 (a) Iron (b) Phosphorus (c) Calcium (d) All of these
- Q.2. Milk is a good source of
 (a) Iron (b) Vitamin B Complex (c) Calcium (d) All of these

PAPER-II

Max. Marks:100

TIME: 2 hours

CPPT

(Marks 100, 100 questions)

Paper Making Operation: Scope and importance of stock preparation, different processes during stock preparation. Introduction to mechanical treatment of pulp fibres, 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 size 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.

Importance and scope of secondary fibre processing, classification of secondary fibres, pre-processing of wastepapers, pulpers and pulper additives, operation of pulpers.

Chemical Recovery : Physical and chemical properties of black liquor, introduction to multiple effect evaporators, brief description of type of evaporators used in black liquor concentration, feeding arrangement, operation of evaporators and operational trouble, introduction to direct contact evaporators. General description of a recovery furnace, operating procedures regarding BL injection, combustion air, smelt flow.

Material and Energy Balance : Conversion of units, units in use for flow, pressure, temperature, humidity, density, viscosity, surface tension, heat, consistency.

Concept of mole, kg mole, molarity, molality, normality, gm per litre, p.p.m. (with simple material balance problems) Basic idea of by-pass, purge, recycle, blow-off, blow down (without numerical problems)

Fluid Handling and Instrumentation : Different types of pipes, thickness of pipe, 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.

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

Working of pressure gauge, vacuum gauge, Volumetric flow measurement, mass flow measurement, working of Rotameter, Venturi meter, Pitot tube, V-notch, On line temperature measurement, level measurement, pH measurement, On-line consistency measurement and regulation, on line moisture, brightness measurement.

Safety and Environment : Basic concept of neat, clean and green environment, different type of pollutants such as toxic gases, reduced sulphur gases, water pollution, different pollutants, solid waste.

Different water pollution control methods such as primary treatment, secondary treatment; different air pollution control methods such as Cyclones, Filterbags, ESPs, Scrubbers.

BOD, COD, TDS, SPM, SS, LD₅₀, Acute Toxicity. Fire hazards, Types of fire such as A, B, C, D, E, Principle and working of Fire Extinguishers.