General Aptitude: Logical Reasoning: Deductive Logical Statements, Data Sufficiency, Logical Diagrams, Number and Letter Series, Age, Time and Calendar, Series Completion, Sitting Arrangement, Logical Sequence, Logical Matching, Logical Connections, Blood and Family Relationships, Coding and Decoding, Number Analogy, Series of Direction and Data Interpretation (Tables and Graphs).

Communication skills: Paragraph Comprehension, Vocabulary Based (Synonyms & Antonyms), English Usage (Grammer): Subject Verb Agreement, Use of Modifier/Articles/Prepositions, Sentence Correction, Meaning – Usage Match, Sentence/Paragraph Completion, Conjunctions, Word Analogy and Reverse Analogy.

Mathematics: Function of one variable, simple double and triple integrals, Convergence and divergence of series, Tests of convergence , Raabe's test, logarithmic test, Cauchy's root test and Gauss test, Periodic functions, Euler's formula. Even and odd functions, Fourier series of different wave forms. Matrix algebra: Rank of a matrix. Elementary transformation, Gauss-Jordan method to find inverse of a matrix, Eigen values, Eigen vectors, Cayley-Hamilton Theorem, Hermitian and similar matrices. Concept of limit and continuity of a function of two variables, partial derivatives, total differential, differentiation of an implicit function, Jacobian Taylor's and Maclaurin's series. Maxima and minima of a function of two variables: Lagrange's method of multipliers. Exact differential equation, Cauchy's homogeneous and Legendre's homogeneous linear differential equations. De-Moivre's theorem and its application, Real and Imaginary parts of exponential , Logarithmic, circular, inverse circular, hyperbolic, inverse hyperbolic functions of complex variable, Summation of trigonometric series. Laplace transforms of various standard functions, transform of derivatives and integrals, Transform of multiplication and division by t, convolution theorem, Laplace transform of unit step function.

Concept of materials: Common engineering materials, steel, plastic, ferrous and non ferrous metals, Timber, Bricks, Cements, Concrete, conductor, semiconductor, insulator, magnetic, ferromagnetic and piezoelectric materials. Material selection criteria.

Solid mechanics and strength of materials: Elastic constants, stress and strain, Hooks law, Bending moment and shear force analysis, principal stresses and strains, Mohr's circle, simple bending theory, bending and shear stresses, torsion of circular shaft.

Fluid mechanics: Fluid properties, pressure, thrust, buoyancy, principle of conservation of mass, moment and energy, Flow kinematics, potential flow, applications of momentum and Bernoulli's equation.

Environmental Engineering: Sources of water supply, Water quality standard, basic unit processes and operations of water treatment, drinking water standard, water requirement, sewage and its treatment, quality and characteristics of wastewater. Types of pollutants, sources and impacts, effects of air pollution and control, air quality standard and limits. Noise pollution and standard, impact of noise, permissible limit, measurement and control of noise.

Thermodynamics, Cycles and IC Engines: Open, closed and isolated systems, heat and work, zeroth, first and second law of thermodynamics, steady flow energy equation, application to non-flow and flow

processes, properties of ideal gases and vapours, simple refrigeration cycle, Carnot cycle and Carnot heat engine, Joule cycle, Rankine cycle, Two stroke and four stroke Compression Ignition and Spark Ignition engines, Otto, diesel and dual cycles, pre-ignition and detonation, spark plug and injector, air standard efficiency.

Manufacturing Science and Engineering: Basic manufacturing processes, their principles and applications, drawing and extrusion, die, investment and shall moulding, centrifugal casting, principle of fabrication processes, Arc and Gas welding, weldability, metal cutting processes, turning, drilling, boring, milling, grinding and finishing, production of flat surfaces, Basics concept on production planning and control.

Engineering Drawing and Graphics: Orthographic projection, projection of oblique areas, reading of orthographic views, missing views and missing lines, dimensioning and their rules, isometric projection, projection of point, line and planes, elements of descriptive geometry, true length, shape, minimum distance and true angle. Introduction to AutoCAD, Simple drawing on AutoCAD.

Mechanism and Machines: Definition, difference between mechanism and machine, simple and compound mechanism, kinematic pairs and chain, belt drive, gear and simple gear train, flywheel and governor, their functions and applications.

Basic Electrical and Electronic Engineering: Kirchoff's laws, Thevenin's, Norton's and maximum power transfer theorems, application of theorems in AC & DC circuits; Series and parallel circuits, resistance, inductance and capacitance and their combinations in series & parallel, power factor; Principle, construction and operation of transformer; characteristics of DC generators and DC motors; Principle of operation of single and three phase induction motor, equivalent circuit, torque-speed characteristics,; Principle of operation and applications of synchronous motor; Conductivity of semiconductor, theory of PN junction diode, and its V-I characteristics, breakdown in PN junction diode, special purpose diodes likes zener diode, tunnel Diode, LED. Half wave, full wave & bridge rectifiers, filters, operation of NPN and PNP transistors, transistor as an amplifier and oscillators; Operating principles of measuring instruments, moving coil permanent magnet instruments, moving iron instruments; Classification and application of different transducers: resistive, inductive, capacitive transducers, linear variable differential transducers (LVDT), piezoelectric transducers, Hall-effect transducers, photoelectric transducers; Number system, logic gates, logic system and circuits ,OR, AND, NOT, NAND, EX-OR, EX-NOR gates, different types of flip-flops, R-S, J-K, D type, T type flip-flops.

Computer Science and Engineering: Elements of computer processing, Operating Systems DOS, UNIX, Windows and Linux, Problem solving-algorithms and flowcharts; Hardware – CPU, Storage devices & media, VDU, I/O Devices. Various software; Basic program construction, Structure of a C program, Standard library functions arrays, Recursive techniques pointers, Array of pointers, memory allocation, Basic searching and sorting techniques, Elementary debugging tools and other IDE tools, Command line arguments, Compilation process. Console I/O (printf, scanf), preprocessor directives, Comments, Data types, Type conversions, Operators – arithmetic, Relational, Logical, Conditional, Increment/decrement,

Library functions, Header files. Simple programs to demonstrate the use of constants, Variables, printf, scanf and operators.