Annexure-VIIA

Syllabus for Civil & Allied Engineering Exam Group – JE

Sl. No.	Subject
1	Engineering Mechanics- Force (resolution of force, moment of force, force system, composition of forces), Equilibrium, Friction, Centroid and Center of gravity, Simple machines.
2	Building Construction- Building components (substructure, superstructure), type of structure (load bearing, framed and composite structures).
3	Building materials- Masonry materials (stones, bricks, and mortars), Timber and miscellaneous materials (glass, plastic, fiber, aluminum steel, galvanized iron, bitumen, PVC, CPVC, and PPF).
4	Construction of substructure- job layout, earthwork, foundation (types, dewatering, coffer dams, bearing capacity).
5	Construction of superstructure- stone masonry, brick masonry, Hollow concrete block masonry, composite masonry, cavity wall, doors and windows, vertical communication (stairs, lifts, escalators), scaffolding and shoring.
6	Building finishes- Floors (finishes, process of laying), walls (plastering, pointing, painting) and roofs (roofing materials including RCC).
7	Building maintenance- Cracks (causes, type, repairs- grouting, guniting, epoxy etc.), settlement (causes and remedial measures), and re-baring techniques.
8	Building drawing- Conventions (type of lines, symbols), planning of building (principles of planning for residential and public buildings, rules and byelaws), drawings (plan, elevation, section, site plan, location plan, foundation plan, working drawing), perspective drawing.
9	Concrete Technology- Properties of various types/grades of cement, properties of coarse and fine aggregates, properties of concrete (water cement ratio, properties of fresh and hardened concrete), Concrete mix design, testing of concrete, quality control of concrete (batching, formwork, transportation, placing, compaction, curing, waterproofing), extreme weather concreting and chemical admixtures, properties of special concrete (ready mix, RCC, pre-stressed, fiber reinforced, precast, high performance).
10	Surveying- Types of survey, chain and cross staff survey (principle, ranging, triangulation, chaining, errors, finding area), compass survey (principle, bearing of line, prismatic compass, traversing, local attraction, calculation of bearings, angles and local attraction) leveling (dumpy level, recording in level book, temporary adjustment, methods of reduction of levels, classification of leveling, tilting level, auto level, sources of errors, precautions and difficulties in leveling), contouring (contour interval, characteristics, method of locating, interpolation, establishing grade contours, uses of contour maps), area and volume measurements, plane table survey (principles, setting, method), theodolite survey (components, adjustments, measurements, traversing), Tacheometric survey, curves (types, setting out), advanced survey equipment, aerial survey and remote sensing.
11	Computer Aided Design- CAD Software (AutoCAD, Auto Civil, 3D Max etc.), CAD commands, generation of plan, elevation, section, site plan, area statement, 3D view.
12	Geo Technical Engineering- Application of Geo Technical Engineering in design of foundation, pavement, earth retaining structures, earthen dams etc., physical properties of soil, permeability of soil and seepage analysis, shear strength of soil, bearing capacity of soil, compaction and stabilization of soil, site investigation and sub soil exploration.
13	Hydraulics- properties of fluid, hydrostatic pressure, measurement of liquid pressure in pipes, fundamentals of fluid flow, flow of liquid through pipes, flow through open channel, flow measuring devices, hydraulic machines.
14	Irrigation Engineering- Hydrology, investigation and reservoir planning, percolation tanks, diversion head works.
15	Mechanics of Structures- Stress and strain, shear force and bending moment, moment of inertia, stresses in beams, analysis of trusses, strain energy.
16	Theory of structures- Direct and bending stresses, slope and deflection, fixed beam, continuous beam, moment distribution method, columns.
17	Design of Concrete Structures- Working Stress method, Limit State method, analysis and design of singly reinforced and doubly reinforced sections, shear, bond and development length, analysis and design of T Beam, slab, axially loaded column and footings.
18	Design of Steel Structures- Types of sections, grades of steel, strength characteristics, IS Code, Connections, Design of tension and compression members, steel roof truss, beams, column bases.
19	Transportation Engineering- Railway Engineering (alignment and gauges, permanent way, railway track geometrics, branching of tracks, stations and yards, track maintenance), Bridge engineering (site selection, investigation, component parts of bridge, permanent and temporary bridges, inspection and maintenance), Tunnel engineering (classification, shape and sizes, tunnel investigation and surveying, method of tunneling in various strata, precautions, equipment, explosives, lining and ventilation).
20	Highway Engineering- Road Engineering, investigation for road project, geometric design of highways, construction of road pavements and materials, traffic engineering, hill roads, drainage of roads, maintenance and repair of roads.
21	Environmental Engineering- Environmental pollution and control, public water supply, domestic sewage, solid waste management, environmental sanitation, and plumbing.

22	Advanced Construction Techniques and Equipment- Fibers and plastics, artificial timber, advanced concreting methods (under water concreting, ready mix concrete, tremix concreting, special concretes), formwork, pre-fabricated construction, soil reinforcing techniques, hoisting and conveying equipment, earth moving machinery (exaction and compaction equipment), concrete mixers, stone crushers, pile driving equipment, working of hot mix bitumen plant, bitumen paver, floor polishing machines.
23	Estimating and Costing- Types of estimates (approximate, detailed), mode of measurements and rate analysis.
24	Contracts and Accounts- Types of engineering contracts, Tender and tender documents, payment, specifications.

Annexure-VIIB

Syllabus for Electrical & Allied Engineering Exam Group – JE

Sl.No.	Subject
1.	Basic concepts: Concepts of resistance, inductance, capacitance, and various factors affecting them. Concepts of current, voltage, power, energy and their units.
2.	Circuit law: Kirchhoff's law, Simple Circuit solution using network theorems.
3.	Magnetic Circuit: Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, Magnetic calculations for conductors of different configuration e.g. straight, circular, solenoidal, etc. Electromagnetic induction, self and mutual induction.
4.	AC Fundamentals: Instantaneous, peak, R.M.S. and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of R.L. and C, Resonance, Tank Circuit. Poly Phase system – star and delta connection, 3 phase power, DC and sinusoidal response of R-Land R-C circuit.
5.	Measurement and measuring instruments: Measurement of power (1 phase and 3 phase, both active and re-active) and energy, 2 wattmeter method of 3 phase power measurement. Measurement of frequency and phase angle. Ammeter and voltmeter (both moving oil and moving iron type), extension of range wattmeter, Multimeters, Megger, Energy meter AC Bridges. Use of CRO, Signal Generator, CT, PT and their uses. Earth Fault detection.
6.	Electrical Machines: (a) D.C. Machine – Construction, Basic Principles of D.C. motors and generators, their characteristics, speed control and starting of D.C. Motors. Method of braking motor, Losses and efficiency of D.C. Machines. (b) 1 phase and 3 phase transformers – Construction, Principles of operation, equivalent circuit, voltage regulation, O.C. and S.C. Tests, Losses and efficiency. Effect of voltage, frequency and wave form on losses. Parallel operation of 1 phase /3 phase transformers. Auto transformers. (c) 3 phase induction motors, rotating magnetic field, principle of operation, equivalent circuit, torque-speed characteristics, starting and speed control of 3 phase induction motors. Methods of braking, effect of voltage and frequency variation on torque speed characteristics, Fractional Kilowatt Motors and Single Phase Induction Motors: Characteristics and applications.
7.	Synchronous Machines: Generation of 3-phase e.m.f. armature reaction, voltage regulation, parallel operation of two alternators, synchronizing, control of active and reactive power. Starting and applications of synchronous motors.
8.	Generation, Transmission and Distribution: Different types of power stations, Load factor, diversity factor, demand factor, cost of generation, inter-connection of power stations. Power factor improvement, various types of tariffs, types of faults, short circuit current for symmetrical faults. Switchgears and Protection: Rating of circuit breakers, Principles of arc extinction by oil and air, H.R.C. Fuses, Protection against earth leakage / over current, etc. Buchholz relay, Merz-Price system of protection of generators & transformers, protection of feeders and bus bars. Lightning arresters, various transmission and distribution system, comparison of conductor materials, efficiency of different system. Cable – Different type of cables, cable rating and derating factor.
9.	Estimation and costing: Estimation of lighting scheme, electric installation of machines and relevant IE rules. Earthing practices and IE Rules.
10.	Utilization of Electrical Energy: Illumination, Electric heating, Electric welding, Electroplating, Electric drives and motors.
11.	Basic Electronics: Working of various electronic devices e.g. P N Junction diodes, Transistors (NPN and PNP type), BJT and JFET. Simple circuits using these devices.

Annexure-VIIC

Syllabus for Electronics & Allied Engineering Exam Group – JE

Sl.No.	Subject
1.	Electronic Components & Materials
	Conductors, Semi conductor& Insulators; Magnetic materials; Jointing & Cleaning materials for U/G copper cable & OFC; Cells and Batteries (chargeable and non chargeable); Relays, Switches, MCB & Connectors.
2.	Electronic Devices and circuits
	PN Junction diodes, thyristor; Diode and triode circuits; Junction Transistors; Amplifiers; Oscillator; Multivibrator, counters; Rectifiers; Inverter and UPS.
3.	Digital Electronics
	Number System & Binary codes; Boolean Algebra & Logic gates; Combinational & Sequential logic circuits; A/D & D/A converter, counters; Memories
4.	Linear Integrated Circuit
	Introduction to operational Amplifier; Linear applications; Non Linear applications; Voltage regulators; Timers; Phase lock loop.
5.	Microprocessor and Microcontroller
	Introduction to microprocessor, 8085 microprocessor working; Assembly Language programming; Peripherals & other microprocessors; Microcontrollers

6.	Electronic Measurements
	Measuring systems; Basic principles of measurement; Range Extension methods; Cathode ray oscilloscope, LCD, LED panel; Transducers
7.	Communication Engineering
	Introduction to communication; Modulation techniques; Multiplexing Techniques; Wave Propagation, Transmission line characteristics, OFC; Fundamentals of Public Address systems, Electronic exchange, Radar, Cellular and Satellite Communication.
8.	Data communication and Network
	Introduction to data communication; Hardware and interface; Introduction to Networks and Networking devices; Local Area Network and Wide area network; Internet working.
9.	Computer Programming
	Programming concepts; Fundamentals of 'C' and C ++; Operators in 'C' and C ++; Control Statements; Functions, Array String & Pointers, File Structure; Data Structure and DBMS
10	Basic Electrical Engg.
	DC Circuits; AC fundamentals; Magnetic, Thermal and Chemical effects of Electric current; Earthing - Installation, Maintenance, Testing,

Annexure-VIID

Syllabus for Mechanical & Allied Engineering Exam Group – JE

1.	Engineering Mechanics :
	Resolution of forces, Equilibrium and Equilibrant, parallelogram law of forces, triangle law of forces, polygon law of forces and Lami's theorem, couple and moment of a couple, condition for equilibrium of rigid body subjected to number of coplanar non-concurrent forces, definition of static friction, dynamic friction, derivation of limiting angle of friction and angle of repose, resolution of forces considering friction when a body moves on horizontal plane and inclined plane, calculation of moment of inertia and radius of gyration of : (a) I-Section (b) channel section (c) T-Section (d) L-Section (Equal & unequal lengths) (e) Z-Section (f) Built up sections (simple cases only), Newton's laws of motion (without derivation), motion of projectile, D'Alembert's principle, definition law of conservation of energy, law of conservation of momentum.
2.	Material Science :
	Mechanical properties of engineering materials – tensile strength, compressive strength, ductility, malleability, hardness, toughness, brittleness, impact strength, fatigue, creep resistance. Classification of steels, mild steel and alloy steels. Importance of heat treatment. Heat treatment processes – annealing, normalizing, hardening, tempering, carburizing, nitriding and cyaniding.
3.	Strength of Materials :
	Stress, strain, stress strain diagram, factor of safety, thermal stresses, strain energy, proof resilience and modules of resilience. Shear force and bending moment diagram – cant leaver beam, simply supported beam, continuous beam, fixed beam. Torsion in shafts and springs, thin cylinder shells.
4.	Machining :
	Working principle of lathe. Types of lathes – Engine lathe – construction details and specifications. Nomenclature of single point cutting tool, geometry, tool signature, functions of tool angles. General and special operations – (Turning, facing, taper turning thread cutting, knurling, forming, drilling, boring, reaming, key way cutting), cutting fluids, coolants and lubricants. Introduction to shaper, slotter, plainer, broaching, milling and manufacture of gears, heat treatment process applied to gears.
5.	Welding :
	Welding – Introduction, classification of welding processes, advantages and limitations of welding, principles of arc welding, arc welding equipment, choice of electrodes for different metals, principle of gas (oxy-acetylene) welding, equipment of gas welding, welding procedures (arc & gas), soldering and brazing techniques, types and applications of solders and fluxes, various flame cutting processes, advantages and limitations of flame cutting, defects in welding, testing and inspection modern welding methods, (submerged, CO2, atomic – hydrogen, ultrasonic welding), brief description of MIG & TIG welding.
6.	Grinding & Finishing Process :
	Principles of metal removal by grinding, abrasives, natural and artificial, bonds and binding processes, vitrified, silicate, shellac rubber, grinding machines, classification: cylindrical, surface, tool & cutter grinding machine, construction details, relative merits, principles of centreless grinding, advantages & limitations of centreless grinding work, holding devices, wheel maintenance, balancing of wheels, coolants used, finishing by grinding, honing, lapping, super finishing, electroplating, basic principles – plating metals, applications, hot dipping, galvanizing tin coating, parkerising, anodizing, metal spraying, wire process, powder process and applications, organic coatings, oil base paint, lacquer base enamels, bituminous paints, rubber base coating.
7.	Metrology :
	Linear measurement – Slip gauges and dial indicators, angle measurements, bevel protractor, sine bar, angle slip gauges, comparators (a) mechanical (b) electrical (c) optical (d) pneumatic. Measurement of surface roughness; methods of measurements by comparison, tracer instruments and by interferometry, collimators, measuring microscope, interferometer, inspection of machine parts using the concepts of shadow projection and profile projection.

8.	Fluid Mechanics & Hydraulic Machinery :
	Properties of fluid, density, specific weight, specific gravity, viscosity, surface tension, compressibility capillarity, Pascal's law, measurement of pressures, concept of buoyancy. Concept of Reynold's number, pressure, potential and kinetic energy of liquids, total energy, laws of conservation, mass, energy and momentum, velocity of liquids and discharge, Bernoulli's equation and assumptions, venturimeters, pitot-tube, current meters. Working principle & constructional details of centrifugal pump, efficiencies – manometric efficiency, volumetric efficiency, mechanical efficiency and overall efficiency, cavitation and its effect, working principle of jet & submersible pumps with line diagrams.
9.	Industrial Management :
	Job analysis, motivation, different theories, satisfaction, performance reward systems, production, planning and control, relation with other departments, routing, scheduling, dispatching, PERT and CPM, simple problems. Materials in industry, inventory control model, ABC Analysis, Safety stock, re-order, level, economic ordering quantity, break even analysis, stores layout, stores equipment, stores records, purchasing procedures, purchase records, Bin card, Cardex, Material handling, Manual lifting, hoist, cranes, conveyors, trucks, fork trucks.
10.	Thermal Engineering :
	Laws of thermo dynamics, conversion of heat into work vice versa , laws of perfect gases, thermo dynamic processes – isochoric, isobaric, isothermal hyperbolic, isentropic, polytrophic and throttling, modes of heat transfer, thermal conductivity, convective heat transfer coefficient, Stefan Boltzman law by radiation and overall heat transfer coefficient. Air standards cycles – Carnot cycle, Otto cycle, Diesel cycle, construction and working of internal combustion engines, comparison of diesel engine and petrol engine. Systems of internal combustion engine, performance of internal combustion engines. Air compressors their cycles refrigeration cycles, principle of a refrigeration plant.

Annexure-VIIE

Syllabus for Computer Science and Information Technology Exam Group – JE (IT)

Sl. No.	Subject
1.	PC Software :
	MS-Windows, MS-Word, MS-Excel & MS-Power Point
2.	Computer fundamentals :
	Evolution of Computers, Hardware & Software, Internet.
3.	C Language :
	Structure, Loop, Control Statements, Arrays, Pointers, Functions, Structure and Union, Files
4.	Computer Organisation :
	Number Systems, Logic Gates, Flip-Flops, Boolean Algebra, DMA, Instruction Sets.
5.	Information Systems :
	Information concepts, Hardware & Software, Overview of Communication Systems, E-Commerce
6.	Data Structure using C^{++} :
	Object oriented Programming, Data Structures, Stack, Queue, Pointers, Linked List, Searching & Sorting Algorithms
7.	DBMS fundamentals :
	BASIC, Data Models, RDBMS, Relational Algebra, SQL, DDL, DML and DCL Statements, Creating Tables, Equi-Joints, Self Joins, PL/SQL, Functions, Cursor and Triggers.
8.	System Programming :
	Back-ground, Assemblers, Loaders and Linkers, Macro Processors, Compilers
9.	Operating System using LINUX :
	Operating System, Types, Features & Basic Architecture of Unix/Linux System, Unix File System & Structure, Linux Commands for files and directories, Filters and Pipes, Process, Creating and Editing Files with VI Editor, System Administration, Role of System Administrator, Managing User Accounts.
10.	Web Technologies and Programming :
	Internet & Intranet, Hardware & Software like Bus, Ethernet, LAN, Routers, Gateways, Bridge, Switches, Subnet etc. Internet Service Provider, Backbones, NAPs, URL, Domain Names, Email, Web Server and Proxy Server, Web Caches, Web Browser like Internet Explorer, Internet Viruses, Internet Security Issues, Firewall, Data Encryption, Digital Signatures and Certificates, Creating the Website and Home Page, HTML Programming Basics, Syntax and Rules, Search and Search Engine for Internet, Outlook Express and Front Page.

11.	System Analysis and Design:
	System components; system planning: Fact finding techniques: Tools for documenting procedure and decisions; Structured Analysis: Data flow analysis; flow diagrams; Data dictionary; Application Prototype: System Design: software development specification; Design - Input, output, files, control. Procedure, Program specification etc: Design of computer output & its presentation.
12.	Data and Network Communication:
	Data Communication - Distributed processing network criteria, protocol and standards. Topologies etc. OSI model, layers. TPC/IP protocol. Digital to Digital Conversion, Digital to analog Conversion, Digital data transmission. Standards, Modems, Cable Modem. Transmission media Guided & Unguided Media, Performance, Wave length; Multiplexing, DSL. Error detection and correction, VRC, LRC, CRC, Ethernet, Token Bus, Token Ring.
13.	Java Programming:
	JAVA and Internet: Support systems and environment; JVM: Data Type: program structure. Constants & Variables, Type Casting; Operators, Class, Creating Objects, Class Members, Constructors, Overloading, Inheritance, Arrays. Creating Threads: Threads Class; Thread Methods; Thread Priority; Synchronization. Applets: Executable Applet, Adding Applet to HTML, File; passing Parameters to Applets.
14.	Software Engineering:
	Software Process - life cycle models; system engineering: Software Requirements - Functional and non-functional; prototyping; verification; validation. Design Concepts and Principles - design heuristic; architectural design; user interface design; system design; SCM process. Software testing - types of test; testing strategies; integration and validation testing system testing and debugging. Software Project Management - Measures and measurements; cost estimation; Task Network; Error Tracking; CASE tools.

Annexure-VIIF

Syllabus for Printing Technology – JE

Sl.No.	Subject
1.	Printing Systems
	Different printing methods; image carriers; impression and ink transfer methods; proofing methods; suitability of jobs for various printing process.
2.	Printing Materials
	Materials used for graphic reproduction; image carriers; printing substrates; inks and coatings; binding materials.
3.	Flexo, Gravure and Screen Printing.
	Flexographic principles and plate surface preparation; flexographic press work; study and preparation of gravure image carrier – Doctor Blade and its care; inks for gravure process; materials used in gravure process; slitting and rewinding machine – equipment used for quality control – defects and remedies; screen printing.
4.	Printing Finishing Processing
	Introduction to binding and finishing; materials used in binding; methods of binding and modern commercial binding; forwarding operations; automation in binding.
5.	Image Processing
	Types of originals – process room equipment; line and halftone photography; digital image processing; computer to fill; image editing softwares.
6.	Design & Advertising in Print Media
	Introduction to typographic design and advertising; role of typography in design; designing aspects of book, magazine and news paper; design of miscellaneous printed products; operations and functions of an advertising agency.
	Sheet fed offset Machines
7.	Offset lithographic presses; printing unit; inking and dampening; sheet handling, controlling and transferring; make ready and machine run; computer print control (CPC).
8.	Publishing Software
	Basic anatomy of a computer; paging softwares; vector graphic editing software; scalar image editing software; desktop publishing software.
9.	Paper and Ink
	Paper manufacture and chemistry of pulp; paper and board classification; properties of paper and conditioning in press room; printing ink gradients, manufacture and its properties; problems with paper and ink on press and their remedies.
10.	Colour Separation and Management
	Colour management; colour reproduction; colour separation; developments in electronic scanning; colour proofing.
11.	Plate Making Methods
	Job planning and film assembly; imposition considerations; lithographic plate surface chemistry; computer to technologies and computer to film; computer to press technologies; computer to plate.

12.	Printing Machine Maintenance
	Maintenance management; types of maintenance and maintenance of spare parts; machinery erection and testing; machine replacement, lubrication and lubricants; machine elements and electrical controls.
13.	Digital Imaging
	Art work and film preparation; film image setters; computer to plate systems; non impact printing and digital offset presses; electronic proofing.
14.	Web offset Printing
	Introduction to web offset printing press; make ready and feeding unit; printing unit; delivery unit; digital offset printing.
15.	Printer's Accounting and Estimating
	Purpose and systems of book keeping; definition of estimating and qualifications of an estimator; estimating forms; meaning and methods of costing; costing of machine; material and direct labour.
16.	Advanced Printing Technologies
	Non impact printing technologies; security printing; speciality printing processes; E-Print.
17.	Package Technology
	Concept of packaging and packaging for various purposes; ancillary materials and metal based materials used in packing; types of labels and their design; types of packaging systems and its advantages; bar coding.

Annexure-VIIG

Syllabus for CMA Exam Group

Sl.No.	Subject
1.	Measurements, Units and Dimensions, Types of errors in measurements, Significance of accuracy in measurement.
2.	Light : Basic principles of light - reflection, refraction, laws of reflection, total internal reflection, interference, diffraction and polarization. Formula for magnification of microscope, telescope. Electro Magnetic spectra.
3.	Heat: Heat as energy- sources of heat, Transmission of heat, Expansion of solids, liquids and gases. Temperature (based on thermal equilibrium), Different Scales of Temperature. Calorimetry, Applications of Specific heat, Latent heat. Anomalous expansion of water and it significance in nature. Combustion, Calorific value, specific heat of gases.
4.	Sound: Sources of sound. Propagation of sound. Velocity of sound in different media / substances. Characteristics of sound. Reflection of sound, echo, Resonance, Sonar and Doppler effect.
5.	Mechanics: Scalars and Vectors. All types of motion. Friction. Newton's laws of motion. Momentum. Equations of motion (under gravity and freely falling), projectile. Range. Laws of Floatation. Work, Power and Energy. Conservation of energy. Center of mass. Centre of gravity. Stability and Equilibrium. Universal law of Gravitation. Relation between 'g' and 'G'. Circular motion, Kepler's Laws. Elasticity and Hooke's Law.
6.	Magnetism: Magnetic field, Uniform and non uniform magnetic fields. Magnetic induction. Magnetic lines of force. Magnetic pole strength, Magnetic moment. Inverse square law of magnetism. Magnetic properties of materials and their classification.
7.	Electricity & Electro Magnetism: Electric charge, field, electric intensity, electric potential, potential difference. Simple Electric Circuits. Conductors, Non conductors / Insulators, Coulomb's inverse square law. Primary and secondary Cells. Ohm's Law - its limitations. Resistances in series and parallel, Emf of a circuit; Specific resistance. Kirchhoff's laws. Relation between electric potential and Electric energy, electric Power (wattage). Heating effect of electric current, and Joule's law. Ampere's law, circular loop and Solenoid. Magnetic force on moving charged particle and long straight conductors. Fleming's left hand rule, Electric motor. Electromagnetic induction – Faraday's law Electromagnetic flux. Lentz law, Generators and Alternating Currents. Inductance – self, mutual inductance and principles of transformer.
8.	Modern Physics: Discharge of Electricity through gases, Cathode rays, Anode rays and their properties; X-rays; Atomic models: JJ Thomson, Rutherford and Bohr's models. Atomic nucleus and its structure. Atomic models: Mass defect; Radio Activity- Discovery, properties of alpha, beta, and gamma radiations. Applications of alpha, beta, and gamma radiations, alpha, beta decays, Half life period, Isotopes, Isobars, and Isotones. Artificial radioactivity; radio isotopes and their uses in different fields; radioactive series; Chain and controlled nuclear reactions; Fission and fusion of nuclei - atomic bomb and hydrogen bomb.
9.	Electronics and Communications: Semi conductors, diode, p-n junction characteristics. Transistor – pnp & npn characteristics and uses. Zener Diode characteristics. Simple electronic circuits, Logic gates – applications, modulation and demodulation.
10.	Matter: States of matter. Elements, Compounds and Mixtures. Methods of separation of mixtures. Chromatography. Behavior of gases; measurable properties of gases; gas laws. Mole concept. Dolton, Avogadro, Berzelius laws.
11.	Chemical Reactions: Physical and chemical changes. Types of Chemical reactions; Physical and Chemical properties various compounds. Chemical calculations. NaOH, Bleaching powder, baking soda, washing soda, and their uses, Plaster of Paris.
12.	Acids and Bases, Salts: Strength and uses of Acids & Bases. Neutralization. Nature and uses of different Salts. Water of crystallization. Complex, Neutral and double salts. Oxidation and Reduction, Rancidity. Identification of Acids, Bases– Indicators: Natural, Chemical. PH Scale - Role of PH in daily life-agriculture, medicine. Classification of salts based on affinity to water Examples of Acidic, Basic, Mixed, Complex, Neutral and double salts. Solutions - Types of solutions; solubility, ionization, Concentration; Oxidation number concept. Balancing of Redox reactions, Calculation of Concentrations. Stoichiometry.

13.	Atomic Structure: Electromagnetic spectrum, Atomic spectrum, Characteristics of electron, proton and neutron, Rutherford's model of an atom, nature of electromagnetic radiation, Plank's quantum mechanics, explanation of photo electric effect, features of atomic spectra, characteristics of hydrogen spectrum, Bohr's theory of structure of atom, Bohr's explanation of spectral lines, failure of Bohr's theory, wave particle nature of electrons, de Broglie's hypothesis, Heisenberg's uncertainty principle, important features of the Quantum mechanical model of an atom, Quantum numbers, concept of orbitals, define an atomic orbital in terms of quantum numbers-shapes of s, p and d orbitals, n l x rule, Energies of electronic energy levels (n+l) rule state Auffbau principle, Pauli's exclusive principle and Hund's rule of maximum multiplicity, electronic configuration of atom, explanation of stability of half filled and completely filled orbital.
14.	Periodic Classification of Elements: Characteristics of elements in groups and periods. Signification of atomic number and electronic configuration as the basis per periodic classification. Classification of elements into s-block, p-block, d-block, f-block and their main characteristics. Periodic trends in physical and chemical properties of elements. Study of different Groups of periodic table.
15.	Chemical Bonding: Ionic and Covalent bonds: Introduction of chemical bonding. Electronic Configuration of Noble gases. sigma, pi bond with examples. Shapes of molecules bond lengths and bond angles in molecules. Hybridization and explanation of H2O, BF3, CH4, NH3 etc. molecules. Hydrogen bonding and types of H bonds.
16.	Carbon and its Compounds: Need to study of carbon compounds separately. Classification of Organic compounds Hydro carbons - Alkanes, alkenes, alkynes aromatic and aliphatic compounds with examples. Bonding in Carbon including Hybridization. Allotropes of Carbon. Versatile nature of carbon. Tetravalency, Chains, branches and rings. Catenation, Isomerism. Saturated and Unsaturated carbon compounds. Bonding of carbon with other elements. Functional groups in carbon compounds. Homologous series. Chemical properties of carbon compounds Combustion and Oxidation. Addition reactions. Substitution reaction. Important carbon compounds. Nomenclature organic compounds. Carbohydrates and their classification. Proteins-examples, Oils and fats examples Polythene - Nylon, PVC, Polyvinyl alcohol; Rubber – uses in daily life. Polymers, and other important organic compounds.
17.	Environmental Chemistry: Different types of pollutions, acid rains, Ozone and its reactions, effects of depletion of ozone layer, Green house effect and global warming, Green Chemistry as an alternative tool for reducing pollution.
18.	Metallurgy: Occurrence of Metals. Minerals, Ores - Examples. Extractions of metals – activity series and related metallurgy, flow chart of steps involved in the extraction of metals from ore. Refining metals, Electrolytic refining, Corrosion – Prevention of Corrosion. Alloys and their uses.