Syllabus for Engineering Stream
Unit 1: Physical World and Measurement

Physics: Scope and excitement; nature of physical laws; Physics, technology and society. Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures. Dimensions of physical quantities, dimensional analysis and its applications.

Unit 2: Kinematics


Unit 3: Laws of Motion


Unit 4: Work, Energy and Power

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power. Notion of potential energy, potential energy of a spring, conservative forces; conservation of mechanical energy; non-conservative forces; motion in a vertical circle, elastic and inelastic collisions in one and two dimensions.

Unit 5: Motion of System of Particles and Rigid Body

Centre of mass of a two-particle system, momentum conservation and centre of mass motion. Centre of mass of a rigid body; centre of mass of uniform rod. Moment of a force, torque, angular momentum, conservation of angular momentum with some examples. Equilibrium of rigid bodies, rigid body rotation and equation of rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration. Values of M.I. for simple geometrical objects. Statement of parallel and perpendicular axes theorems and their applications.

Unit 6: Gravitation


Unit 7: Properties of Bulk Matter

Unit 8: Thermodynamics

Unit 9: Behaviour of Perfect Gas and Kinetic Theory
Equation of state of a perfect gas, work done on compressing a gas. Kinetic theory of gases: Assumptions, concept of pressure. Kinetic energy and temperature; rms speed of gas molecules; degrees of freedom, law of equipartition of energy and application to specific heat capacities of gases; concept of mean free path, Avogadro’s number.

Unit 10: Oscillations and Waves

Unit 11: Electrostatics
Electric charges and their conservation. Coulomb’s law – force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution. Electric field, electric field due to a point charge, electric field lines; electric dipole, electric field due to a dipole; torque on a dipole in a uniform electric field. Electric flux, statement of Gauss’s theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside). Electric potential, potential difference, electric potential energy of a system of two point charges and of electric dipoles in an electrostatic field. Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor, Van de Graaff generator.

Unit 12: Current Electricity
Electric current, flow of electric charges in a metallic conductor, drift velocity and mobility, and their relation with electric current; Ohm’s law, electrical resistance, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity. Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors; temperature dependence of resistance. Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel. Kirchhoff’s laws and simple applications. Wheatstone bridge, metre bridge. Potentiometer – principle and applications to measure potential difference, and for comparing emf of two cells; measurement of internal resistance of a cell.

Unit 13: Magnetic Effects of Current and Magnetism
Concept of magnetic field, Oersted’s experiment. Biot - Savart law and its application to current carrying circular loop. Ampere’s law and its application to infinitely long straight wire, straight and toroidal solenoids. Force on a moving charge in uniform magnetic and electric fields. Cyclotron. Force on a current-carrying conductor in a uniform magnetic field. Force between two parallel current-carrying conductors – definition of ampere. Torque experienced by a current loop in a magnetic field; moving coil galvanometer – its current sensitivity and conversion to ammeter and voltmeter. Current loop as a magnetic dipole and its magnetic dipole moment. Magnetic dipole moment of a revolving electron. Magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis. Torque on a magnetic dipole (bar magnet) in a uniform magnetic field; bar magnet as an equivalent solenoid, magnetic field lines; Earth’s magnetic field and magnetic elements.
Para-, dia- and ferro - magnetic substances, with examples. Electromagnets and factors affecting their strengths. Permanent magnets.

**Unit 14: Electromagnetic Induction and Alternating Currents**
Electromagnetic induction; Faraday’s law, induced emf and current; Lenz’s Law, Eddy currents. Self and mutual inductance. Alternating currents, peak and rms value of alternating current/voltage; reactance and impedance; LC oscillations, LCR series circuit, resonance; power in AC circuits, watts, current. AC generator and transformer.

**Unit 15: Electromagnetic Waves**
Need for displacement current. Electromagnetic waves and their characteristics. Transverse nature of electromagnetic waves. Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, x-rays, gamma rays) including elementary facts about their uses.

**Unit 16: Optics**

**Unit 17: Dual Nature of Matter and Radiation**
Photoelectric effect, Hertz and Lenard’s observations; Einstein’s photoelectric equation – particle nature of light. Matter waves – wave nature of particles, de Broglie relation. Davisson-Germer experiment

**Unit 18: Atoms and Nuclei**
Alpha - particle scattering experiment; Rutherford’s model of atom; Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Radioactivity – alpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission and fusion.

**Unit 19: Electronic Devices**
Energy bands in solids, conductors, insulators and semiconductors; semiconductor diode – I-V characteristics in forward and reverse bias, diode as a rectifier; I-V characteristics of LED, photodiode, solar cell, and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch.

**Unit 20: Communication Systems**
Elements of a communication system, bandwidth of signals (speech, TV and digital data); bandwidth of transmission medium. Propagation of electromagnetic waves in the atmosphere, sky and space wave propagation. Need for modulation. Production and detection of an amplitude-modulated wave.
Unit 1: Some Basic Concepts of Chemistry

General Introduction: Importance and scope of chemistry. Historical approach to particulate nature of matter, laws of chemical combination, Dalton’s atomic theory: concept of elements, atoms and molecules. Atomic and molecular masses. Mole concept and molar mass; percentage composition and empirical and molecular formula; chemical reactions, stoichiometry and calculations based on stoichiometry.

Unit 2: Structure of Atom

Discovery of electron, proton and neutron; atomic number, isotopes and isobars. Thompson’s model and its limitations, Rutherford’s model and its limitations, Bohr’s model and its limitations, concept of shells and subshells, dual nature of matter and light, de Broglie’s relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals - Aufbau principle, Pauli exclusion principle and Hund’s rule, electronic configuration of atoms, stability of half filled and completely filled orbitals.

Unit 3: Classification of Elements and Periodicity in Properties

Significance of classification, brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements – atomic radii, ionic radii, inert gas radii, ionization enthalpy, electron gain enthalpy, electronegativity, valence. Nomenclature of elements with atomic number greater than 100.

Unit 4: Chemical Bonding and Molecular Structure


Unit 5: States of Matter: Gases and Liquids

Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, role of gas laws in elucidating the concept of the molecule, Boyle’s law, Charle’s law, Gay Lussac’s law, Avogadro’s law, ideal behaviour, empirical derivation of gas equation, Avogadro number, ideal gas equation. Kinetic energy and molecular speeds (elementary idea), deviation from ideal behaviour, liquefaction of gases, critical temperature. Liquid State – Vapour pressure, viscosity and surface tension.

Unit 6: Thermodynamics

Concepts of system, types of systems, surroundings, work, heat, energy, extensive and intensive properties, state functions. First law of thermodynamics – internal energy and enthalpy, heat capacity and specific heat, Hess’s law of constant heat summation, enthalpy of : bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution. Introduction of entropy as a state function. Second law of thermodynamics, Gibbs energy change for spontaneous and non-spontaneous process, criteria for equilibrium. Third law of thermodynamics – Brief introduction.

Unit 7: Equilibrium

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium – Le Chatelier’s principle; ionic equilibrium – ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of polybasic acids, acid strength, concept of pH., Hydrolysis of salts (elementary idea), buffer solutions, Henderson equation, solubility product, common ion effect.

Unit 8: Redox Reactions

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions in terms of loss and gain of electron and change in oxidation numbers, applications of redox reactions.

Unit 9: Hydrogen

Position of hydrogen in periodic table, occurrence, isotopes, preparation, properties and uses of hydrogen; hydrides – ionic, covalent and interstitial; physical and chemical properties of water, heavy water; hydrogen peroxide-preparation, reactions, use and structure; hydrogen as a fuel.
Unit 10: s-Block Elements (Alkali and Alkaline earth metals)

Group 1 and Group 2 elements: General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens; uses. Preparation and Properties of Some Important Compounds: Sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogen carbonate, biological importance of sodium and potassium. CaO, CaCO3, and industrial use of lime and limestone, biological importance of Mg and Ca.

Unit 11: Some p-Block Elements

General Introduction to p-Block Elements: Group 13 elements: General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of first element of the group; Boron: physical and chemical properties, some important compounds: borax, boric acids, boron hydrides. Aluminium: uses, reactions with acids and alkalis. Group 14 elements: General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behaviour of first element. Carbon catenation, allotropes, physical and chemical properties; uses of some important compounds: oxides. Important compounds of silicon and a few uses: silicon tetrachloride, silicones, silicates and zeolites, their uses.

Unit 12: Organic Chemistry – Some Basic Principles and Techniques


Unit 13: Hydrocarbons


Unit 14: Environmental Chemistry

Environmental pollution – Air, water and soil pollution, chemical reactions in atmosphere, smogs, major atmospheric pollutants; acid rain, ozone and its reactions, effects of depletion of ozone layer, greenhouse effect and global warming – pollution due to industrial wastes; green chemistry as an alternative tool for reducing pollution, strategy for control of environmental pollution.

Unit 15: Solid State

Classification of solids based on different binding forces: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea), unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties, Band theory of metals, conductors, semiconductors and insulators and n and p type semiconductors.

Unit 16: Solutions

Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in
liquids, solid solutions, colligative properties – relative lowering of vapour pressure, Raoult’s law, elevation of B.P., depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Vant Hoff factor.

**Unit 17: Electrochemistry**
Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch’s Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential. Nernst equation and its application to chemical cells. Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion.

**Unit 18: Chemical Kinetics**
Rate of a reaction (average and instantaneous), factors affecting rates of reaction: concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half life (only for zero and first order reactions); concept of collision theory (elementary idea, no mathematical treatment). Activation energy, Arrhenious equation.

**Unit 19: Surface Chemistry**
Adosorption – physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis:homogenous and heterogeneous, activity and selectivity: enzyme catalysis; colloidal state: distinction between true solutions, colloids and suspensions; lyophilic, lyophobic multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsions – types of emulsions.

**Unit 20: General Principles and Processes of Isolation of Elements**
Principles and methods of extraction – concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and iron.

**Unit 21: p-Block Elements**

**Unit 22: d and f Block Elements**

**Unit 23: Coordination Compounds**
Coordination compounds: Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds, bonding, Werner’s theory VBT,CFT; isomerism (structural and stereo)importance of coordination compounds (in qualitative analysis, extraction of metals and biological systems).

**Unit 24: Haloalkanes and Haloarenes**
Haloalkanes: Nomenclature, nature of C-X bond, physical and chemical properties, mechanism of

**Unit 25: Alcohols, Phenols and Ethers**

**Unit 26: Aldehydes, Ketones and Carboxylic Acids**
*Aldehydes and Ketones*: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, and mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes; uses.*Carboxylic Acids*: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

**Unit 27: Organic Compounds Containing Nitrogen**
*Amines*: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary secondary and tertiary amines. *Cyanides and Isocyanides* – will be mentioned at relevant places in context. *Diazonium salts*: Preparation, chemical reactions and importance in synthetic organic chemistry.

**Unit 28: Biomolecules**

**Unit 29: Polymers**
*Classification* – Natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers: natural and synthetic like polythene, nylon, polyesters, bakelite, rubber. Biodegradable and non-biodegradable polymers.

**Unit 30: Chemistry in Everyday Life**
2. Chemicals in food – preservatives, artificial sweetening agents, elementary idea of antioxidants.
UNIT 1: SETS AND FUNCTIONS

1. Sets

2. Relations and Functions
Ordered pairs, Cartesian product of sets. Number of elements in the Cartesian product of two finite sets. Cartesian product of the reals with itself (upto \( R \times R \times R \)).
Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special kind of relation from one set to another. Pictorial representation of a function, domain, co-domain and range of a function. Real valued function of the real variable, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs. Sum, difference, product and quotients of functions.

3. Trigonometric Functions
Positive and negative angles. Measuring angles in radians and in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Truth of the identity \( \sin 2x + \cos 2x = 1 \), for all \( x \). Signs of trigonometric functions and sketch of their graphs. Expressing \( \sin(x + y) \) and \( \cos(x + y) \) in terms of \( \sin x, \sin y, \cos x \) and \( \cos y \). Deducing the identities like following:

\[
\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}, \quad \cot(x \pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x}
\]

\[
\sin x + \sin y = 2 \sin \frac{x + y}{2} \cos \frac{x - y}{2}, \quad \cos x + \cos y = 2 \cos \frac{x + y}{2} \cos \frac{x - y}{2}
\]

\[
\sin x - \sin y = 2 \cos \frac{x + y}{2} \sin \frac{x - y}{2}, \quad \cos x - \cos y = -2 \sin \frac{x + y}{2} \sin \frac{x - y}{2}
\]

Identities related to \( \sin 2x, \cos 2x, \tan 2x, \sin 3x, \cos 3x \) and \( \tan 3x \).

UNIT 2: ALGEBRA

1. Principle of Mathematical Induction
Process of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple applications.

2. Complex Numbers and Quadratic Equations
Need for complex numbers, especially \( \sqrt{-1} \), to be motivated by inability to solve every quadratic equation. Brief description of algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system. Square-root of a Complex number.

3. Linear Inequalities
Linear inequalities, Algebraic solutions of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Solution of system of linear inequalities in two variables - graphically.

4. Permutations and Combinations
Fundamental principle of counting. Factorial \( n \). Permutations and combinations derivation of formulae and their connections, simple applications.

5. Binomial Theorem
History, statement and proof of the binomial theorem for positive integral indices. Pascal’s triangle, general and middle term in binomial expansion, simple applications.
6. Sequence and Series
Sequence and Series. Arithmetic Progression (A.P.), Arithmetic Mean (A.M.), Geometric Progression (G.P.), general term of a G.P., sum of \( n \) terms of a G.P. Arithmetic and geometric series, infinite G.P. and its sum, geometric mean (G.M.). Relation between A.M. and G.M.

UNIT 3: COORDINATE GEOMETRY
1. Straight Lines
Brief recall of 2-D from earlier classes, shifting of origin. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, two-point form, intercepts form and normal form. General equation of a line. Equation of family of lines passing through the point of intersection of two lines. Distance of a point from a line.

2. Conic Sections
Sections of a cone: Circles, ellipse, parabola, hyperbola, a point, a straight line and pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.

3. Introduction to Three-dimensional Geometry
Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points and section formula.

UNIT 4: CALCULUS
Limits and Derivatives
Derivative introduced as rate of change both as that of distance function and geometrically.

\[
\lim_{x \to 0} \frac{\log_e(1 + x)}{x} = \lim_{x \to 0} \frac{e^x - 1}{x}.
\]
Definition of derivative, relate it to slope of tangent of the curve, derivative of sum, difference, product and quotient of functions. Derivatives of polynomial and trigonometric functions.

UNIT 5: MATHEMATICAL REASONING
Mathematically acceptable statements. Connecting words/phrases - consolidating the understanding of “if and only if (necessary and sufficient) condition”, “implies”, “and/or”, “implied by”, “and”, “or”, “there exists” and their use through variety of examples related to real life and Mathematics. Validating the statements involving the connecting words - difference between contradiction, converse and contrapositive.

UNIT 6: STATISTICS AND PROBABILITY
1. Statistics
Measure of dispersion; mean deviation, variance and standard deviation of ungrouped/grouped data. Analysis of frequency distributions with equal means but different variances.

2. Probability

UNIT 7: RELATIONS AND FUNCTIONS
1. Relations and Functions
Types of relations: Reflexive, symmetric, transitive and equivalence relations. One to one and onto functions, composite functions, inverse of a function. Binary operations.

2. Inverse Trigonometric Functions
Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.

UNIT 8: ALGEBRA
1. Matrices
Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication
of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). Concept of elementary row and column operations. Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).

2. Determinants
Determinant of a square matrix (up to $3 \times 3$ matrices), properties of determinants, minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

UNIT 9: CALCULUS
1. Continuity and Differentiability (Periods 18)

2. Applications of Derivatives (Periods 10)
Applications of derivatives: Rate of change, increasing/decreasing functions, tangents and normals, approximation, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

3. Integrals
Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type –

\[
\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}.
\]

\[
\int \frac{(px + q)}{ax^2 + bx + c} \, dx, \int \frac{(px + q)}{\sqrt{ax^2 + bx + c}} \, dx, \sqrt{a^2 - x^2} \, dx \text{ and } \sqrt{x^2 - a^2} \, dx.
\]

\[
\int \sqrt{ax^2 + bx + c} \, dx \text{ and } \int (px + q) \sqrt{ax^2 + bx + c} \, dx \text{ to be evaluated.}
\]

Definite integrals as a limit of a sum. Fundamental Theorem of Calculus. Basic properties of definite integrals and evaluation of definite integrals.

4. Applications of the Integrals
Applications in finding the area under simple curves, especially lines, arcs of circles/parabolas/ellipses, area between the two above said curves (the region should be clearly identifiable).

5. Differential Equations
Definition, order and degree, general and particular solutions of a differential equation. Formation of differential equation whose general solution is given. Solution of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type

\[
\frac{dy}{dx} + Py = Q, \text{ where } P \text{ and } Q \text{ are functions of } x \text{ or constant}
\]

\[
\frac{dx}{dy} + Px = Q, \text{ where } P \text{ and } Q \text{ are functions of } y \text{ or constant}
\]

UNIT 10: VECTORS AND THREE-DIMENSIONAL GEOMETRY
1. Vectors
Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratios of vectors. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position
vector of a point dividing a line segment in a given ratio. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors, scalar triple product.

2. Three-dimensional Geometry
Direction cosines/ratios of a line joining two points. Cartesian and vector equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines, (ii) two planes, (iii) a line and a plane. Distance of a point from a plane.

Unit V: Linear Programming
Introduction, related terminology such as constraints, objective function, optimization, different types of linear programming (L.P.) problems, mathematical formulation of L.P. problems, graphical method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constrains).

Unit VI: Probability
Multiplications theorem on probability. Conditional probability, independent events, total probability, Baye’s theorem. Random variable and its probability distribution, mean and variance of haphazard variable. Repeated independent (Bernoulli) trials and Binomial distribution.

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