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CLASS-XI

SYLLABUS

(2026-27)

ST. THOMAS SCHOOL, AGRA Syllabus (2026-2027) Class- XI					
UT-1	**Half-yearly Exam**		**UT-2**	**Annual Exam**	
		Project			**Project**
English Language (Total English Morning Star)					
1. Directed Writing (Based on suggested points) i. Feature article ii. Book review **2. Proposal writing** (including The Heading, Statement of Objective, List of measures) **3. Functional English Grammar:** i. Transformation of Sentences ii. Phrasal Verbs iii. Verbs/ Tenses	**1. Composition** i. Short Story ii. Descriptive iii. Narrative iv. Argumentative v. Imaginative vi. Present your reflections **2. Directed Writing** (Based on suggested points) i. Feature article ii. Book review iii. Speech writing iv. Newspaper report v. Statement of purpose **2. Proposal writing** (including The Heading, Statement of Objective, List of measures) **3. Functional English Grammar:** i. Transformation of Sentences ii. Phrasal Verbs	Write a **factual report** about an event or situation- A school event (annual function, sports day, seminar) **Format:** Heading Byline Date and place Introduction Main details (what, when, where, why, who) Conclusion. **Note:** Word Limit- 500 words. File to be used- Milky file	**1. Directed Writing** (Based on suggested points) i. Feature article ii. Book review **2. Proposal writing** (including The Heading, Statement of Objective, List of measures) **3. Functional English Grammar:** i. Transformation of Sentences ii. Phrasal Verbs iii. Verbs/ Tenses	**1. Composition** i. Short Story ii. Descriptive iii. Narrative iv. Argumentative v. Imaginative vi. Present your reflections **2. Directed Writing** (Based on suggested points) i. Feature article ii. Book review iii. Speech writing iv. Newspaper report v. Statement of purpose **2. Proposal writing** (including The Heading, Statement of Objective, List of measures) **3. Functional English Grammar:** i. Transformation of Sentences ii. Phrasal Verbs iii. Verbs/ Tenses **4. Comprehension**	Write an **argumentative or reflective piece** expressing your views on the topic-Is technology making us less social? **Guidelines**: Clearly state your opinion Support with reasons and examples Maintain a logical flow Conclude effectively **Note**: Word Limit- 500 words. File to be used- Milky file

	iii. Verbs/ Tenses **4. Comprehension**				
English Literature (Prism, Rhapsody and Macbeth)					
Prism Prose 1- A Living God **Rhapsody** Poetry 1- Abhisara - The Tryst **Macbeth** Act - 1 Scene 1,2 and 3	**Prism** Prose 1- A Living God Prose 2- Advice to youth Prose 3- The paper Menagerie **Rhapsody** Poetry 1- Abhisara - The Tryst Poetry 2- Why I like the hospital Poetry 3- Sonnet 116 **Macbeth** Act - 1 Scene 1,2,3,4,5,6 and 7	Compare and contrast the portrayal of individuality and societal expectations through the main characters in A Living God, Advice to Youth, and The Paper Menagerie. How do their responses to authority and cultural norms reveal deeper themes about human behavior? Note: The project is to be prepared on interleaf pages in a Thread File. The total content of complete Literature project must be within 1000-1500 words. Provide a separate title page.	**Prism** Prose 4- The great Automatic Grammatizator **Rhapsody** Poetry 4-Death of a naturalist **Macbeth** Act - 2 Scene 1 and 2	**Prism** Prose 1- A Living God Prose 2- Advice to youth Prose 3- The paper Menagerie Prose 4- The great Automatic Grammatizator Prose 5- Thank You, Ma'am **Rhapsody** Poetry 1- Abhisara - The Tryst Poetry 2- Why I like the hospital Poetry 3- Sonnet 116 Poetry 4-Death of a naturalist Poetry 5- Strange Meeting **Macbeth** Act - 1 Scene 1,2,3,4,5,6 and 7 Act - 2 Scene 1,2,3 and 4	How can the themes of war, death, and lost humanity in Strange Meeting by Wilfred Owen be reimagined through an original short story, and how can narrative techniques be used to capture the emotional impact of the poem? Note: The project is to be prepared on interleaf pages in a Thread File. The total content of complete Literature project must be within 1000-1500 words. Provide a separate title page.
Mathematics (S. Chand Mathematics)					
1.Sets Sets and their representations. Empty set. Finite	**1.Sets** Sets and their representations. Empty set. Finite and		**5. Statistics and Probability**	**1.Sets** Sets and their representations. Empty set. Finite and Infinite sets.	

and Infinite sets. Equal sets. Subsets. Subsets of a set of real numbers, especially intervals (with notations). Power set. Universal set. Venn diagrams. Union and Intersection of sets. Difference of sets. Complement of a set. Properties of Complement of Sets. **2.Relations & Functions** Ordered pairs. Cartesian product of sets. Number of elements in the cartesian product of two finite sets. Cartesian product of the set of reals with itself (upto R×R×R). Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special type of	Infinite sets. Equal sets. Subsets. Subsets of a set of real numbers, especially intervals (with notations). Power set. Universal set. Venn diagrams. Union and Intersection of sets. Difference of sets. Complement of a set. Properties of Complement of Sets. **2.Relations & Functions** Ordered pairs. Cartesian product of sets. Number of elements in the cartesian product of two finite sets. Cartesian product of the set of reals with itself (upto R×R×R). Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special type of relation. Function as a type of mapping, domain, co-domain		**(i) Statistics** Measures of dispersion: range, mean deviation, variance and standard deviation of ungrouped/grouped data. • Mean deviation about mean. • Standard deviation - by direct method, short cut method and step deviation method. • Combined mean and standard deviation. **(ii) Probability** Random experiments; outcomes, sample spaces (set representation). Events; occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events, Axiomatic (set theoretic) probability, connections with other theories studied in earlier classes. Probability of an event, probability of 'not', 'and' and 'or'	Equal sets. Subsets. Subsets of a set of real numbers, especially intervals (with notations). Power set. Universal set. Venn diagrams. Union and Intersection of sets. Difference of sets. Complement of a set. Properties of Complement of Sets. **2.Relations & Functions** Ordered pairs. Cartesian product of sets. Number of elements in the cartesian product of two finite sets. Cartesian product of the set of reals with itself (upto R×R×R). Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special type of relation. Function as a type of mapping, domain, co-domain and range of a function. Real valued functions, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum, exponential, logarithmic and greatest integer	

relation. Function as a type of mapping, domain, co-domain and range of a function. Real valued functions, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum, exponential, logarithmic and greatest integer functions. Sum, difference, product and quotient of functions.	and range of a function. Real valued functions, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum, exponential, logarithmic and greatest integer functions. Sum, difference, product and quotient of functions. **3.Trigonometry** **Angles and Arc lengths** - Angles: Convention of sign of angles. - - Magnitude of an angle: Measures of Angles; Circular measure. The relation S = rθ where θ is in radians. Relation between radians and degree. - Definition of trigonometric functions with the help of unit circle. - Truth of the identity $\sin^2 x + \cos^2 x = 1$		events. • Random experiments and their outcomes. • Events: sure events, impossible events, mutually exclusive and exhaustive events. - Definition of probability of an event - Laws of probability addition theorem.	functions. Sum, difference, product and quotient of functions. **3.Trigonometry** **Angles and Arc lengths** - Angles: Convention of sign of angles. - - Magnitude of an angle: Measures of Angles; Circular measure. The relation S = rθ where θ is in radians. Relation between radians and degree. - Definition of trigonometric functions with the help of unit circle. - Truth of the identity $\sin^2 x + \cos^2 x = 1$ **Trigonometric Functions** - Relationship between trigonometric functions. - Proving simple identities. - Signs of trigonometric functions. - Domain and range of the trigonometric functions. - Trigonometric functions of all angles. - Periods of trigonometric functions. - Graphs of simple trigonometric functions (only sketches). **Compound and multiple angles** - Addition and	

	Trigonometric Functions - Relationship between trigonometric functions. - Proving simple identities. - Signs of trigonometric functions. - Domain and range of the trigonometric functions. - Trigonometric functions of all angles. - Periods of trigonometric functions. - Graphs of simple trigonometric functions (only sketches). **Compound and multiple angles** - Addition and subtraction formula: sin(A±B); cos(A±B); tan(A±B); tan(A + B + C) etc., Double angle, triple angle, half angle and one third angle formula as special cases. - Sum and differences as products - Product to sum or difference i.e.			subtraction formula: sin(A±B); cos(A±B); tan(A±B); tan(A + B + C) etc., Double angle, triple angle, half angle and one third angle formula as special cases. - Sum and differences as products - Product to sum or difference i.e. 2sinAcosB = sin (A + B) + sin (A – B) etc. **4. Algebra** **(i) Complex Numbers** **Introduction of** complex numbers and their representation, Algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Square root of a complex number. Cube root of unity. - Conjugate, modulus and argument of complex numbers and their properties. - Sum, difference, product, and quotient of two complex numbers. Additive and multiplicative inverse of a complex number. - Square root of a complex number. - Cube roots of unity and their properties.	

	2sinAcosB = sin (A + B) + sin (A – B) etc. **4. Algebra** **(i) Complex Numbers** **Introduction of** complex numbers and their representation, Algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Square root of a complex number. Cube root of unity. - Conjugate, modulus and argument of complex numbers and their properties. - Sum, difference, product, and quotient of two complex numbers. Additive and multiplicative inverse of a complex number. - Square root of a complex number. - Cube roots of unity and their properties. (ii) **Quadratic Equations**			(ii) **Quadratic Equations** Statement of Fundamental Theorem of Algebra, solution of quadratic equations (with real coefficients).• Equations reducible to quadratic form. • Nature of roots - Product and sum of roots. - Roots as rational, irrational, equal, reciprocal, one square of the other. - Complex roots. - Framing quadratic equations with given roots. • **Quadratic Functions** Given α, β as roots then find the equation whose roots are of the form 3 3,β α , etc. Real roots Case I: a > 0 Complex roots Equal roots 3 ISC Examination Year 2028 Real roots Case II: a < 0 Complex roots, Equal roots Where 'a' is the coefficient of x^2 in the equations of the form $ax^2 + bx + c = 0$. • **Sign of quadratic** Sign when the roots are real and when they are complex. • Graph of quadratic function.	

	Statement of Fundamental Theorem of Algebra, solution of quadratic equations (with real coefficients).• Equations reducible to quadratic form. • Nature of roots - Product and sum of roots. - Roots as rational, irrational, equal, reciprocal, one square of the other. - Complex roots. - Framing quadratic equations with given roots. **• Quadratic Functions** Given α, β as roots then find the equation whose roots are of the form 3 3,β α , etc. Real roots Case I: a > 0 Complex roots Equal roots 3 ISC Examination Year 2028 Real roots Case II: a < 0 Complex roots, Equal roots Where 'a' is the coefficient of x^2 in the			Maximum/minimum value of quadratic function and value of x for which maximum/minimum occurs. **• Inequalities** - Linear Inequalities Algebraic solutions of linear inequalities in one variable and their representation on the number line. Self-explanatory. - Quadratic Inequalities Using method of intervals for solving problems of the type: 0 6 2 ≥ − +x x + - + -3 2 A perfect square e.g. 0 9 6 2 ≥ + − x x . - Inequalities involving rational expression of type ( ) ( ) f x a g x ≤ , etc. to be covered. **(iii) Permutations and Combinations** Fundamental principle of counting. Factorial n (n!) . Permutations and combinations, derivation of formulae for Pn r and Cn r , their connections, and applications. • Factorial notation n! , n! =n (n-1)! • Fundamental principle of counting. • Permutations -	

	equations of the form $ax^2 + bx + c = 0$. • **Sign of quadratic** Sign when the roots are real and when they are complex. • Graph of quadratic function. Maximum/minimum value of quadratic function and value of x for which maximum/minimum occurs. • **Inequalities** - Linear Inequalities Algebraic solutions of linear inequalities in one variable and their representation on the number line. Self-explanatory. - Quadratic Inequalities Using method of intervals for solving problems of the type: 0 6 2 ≥ – +x x + - + -3 2 A perfect square e.g. 0 9 6 2 ≥ + – x x . - Inequalities involving rational expression of			nPr . - Restricted permutation. - Certain things always occur together. - Certain things never occur. - Formation of numbers with digits. - Word building - repeated letters - No letters repeated. - Permutation of alike things. - Permutation of Repeated things. - Circular permutation – clockwise counterclockwise – Distinguishable / not distinguishable. • Combinations - When all things are different. - When all things are not different. • Mixed problems on permutation and combinations. **(iv) Binomial Theorem** History, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, General and middle term(s) in binomial expansion, applications. • Significance of Pascal's triangle. • Binomial theorem for positive integral powers.	

	type ( ) ( ) f x a g x ≤ , etc. to be covered. **(iii) Permutations and Combinations** Fundamental principle of counting. Factorial n (n!) . Permutations and combinations, derivation of formulae for Pn r and Cn r , their connections, and applications. • Factorial notation n! , n! =n (n-1)! • Fundamental principle of counting. • Permutations - nPr . - Restricted permutation. - Certain things always occur together. - Certain things never occur. - Formation of numbers with digits. - Word building - repeated letters - No letters repeated. - Permutation of alike things. - Permutation of Repeated things. - Circular permutation – clockwise			. • Binomial coefficients. Questions based on the above. (v) **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 first n terms of a G.P., infinite G.P. and its sum, geometric mean (G.M.), relation between A.M. and G.M. Formulae for the following special sums 3 2, , . • Arithmetic Progression (A.P.) Geometric Progression (G.P.) - Geometric Mean, ac =b - Inserting two or more Geometric Means between any two numbers. - Three terms are in G.P.: ar, a, ar^{-1} - Four terms are in G.P.: ar^3, ar, ar^{-1}, ar^{-3} • Special sums 3 2, , Using these summations to sum up other related expression. Finding the nth term of a sequence using Method of difference. **5. Coordinate Geometry**	

	counterclockwise – Distinguishable / not distinguishable. • Combinations - When all things are different. - When all things are not different. • Mixed problems on permutation and combinations. **(iv) Binomial Theorem** History, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, General and middle term(s) in binomial expansion, applications. • Significance of Pascal's triangle. • Binomial theorem for positive integral powers. . • Binomial coefficients. Questions based on the above. (v) **Sequence and Series** Sequence and			**(i) Straight Lines** Brief recall of two-dimensional geometry from earlier classes. Shifting of origin. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axis, point-slope form, slope-intercept form, two-point form, intercept 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. • Brief recall of basic concepts of Points and their coordinates. - - - Section formula (internally/externally). Coordinates of incentre, Area of triangle when vertices are given. Condition for collinearity of three points. • **The straight line** - Slope or gradient of a line.Angle between two lines. Condition of perpendicularity and parallelism. Various forms of equation of lines. Slope	

	Series. Arithmetic Progression (A.P.). Arithmetic Mean (A.M.). Geometric Progression (G.P.), general term of a G.P., sum of first n terms of a G.P., infinite G.P. and its sum, geometric mean (G.M.), relation between A.M. and G.M. Formulae for the following special sums 3 2, , . • Arithmetic Progression (A.P.) Geometric Progression (G.P.) - Geometric Mean, ac =b - Inserting two or more Geometric Means between any two numbers. - Three terms are in G.P.: ar, a, ar^{-1} - Four terms are in G.P.: ar^{3}, ar, ar^{-1}, ar^{-3} • Special sums 3 2, , Using these summations to sum up other related expression. Finding the nth term of a sequence using Method of difference.			intercept form. Two-point slope form. Intercept form. Perpendicular /normal form. General equation of a line. Distance of a point from a line. Distance between parallel lines. Equation of lines bisecting the angle between two lines. Equation of family of lines. Definition of a locus. Equation of a locus. **(ii) Circles** • Equations of a circle in: - Standard form. - - - Diameter form. General form. Parametric form. • Given the equation of a circle, to find the centre and the radius. • Finding the equation of a circle. - Given three non-collinear points. - - Given other sufficient data, for example, the centre is (h, k) and it lies on a line and two points on the circle are given, etc. When circles touch each other externally/internally. • Intercepts made by the circle on the axes. • Relative position of two circles.	

				(iii) Conic Section Sections of a cone, ellipse, parabola, hyperbola, a point, a straight line and a pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. • Conics as a section of a cone. - Definition of Foci, Directrix, Latus Rectum. - - - PS = ePL, where P is a point on the conics, S is the focus, PL is the perpendicular distance of the point from the directrix. (i) Parabola e =1, $y^2 = 4ax$, $x^2 = 4ay$, $y^2 = -4ax$, $x^2 = -4ay$. Rough sketch of the above. - - - The latus rectum; quadrants they lie in; coordinates of focus and vertex; and equations of directrix and the axis. Finding equation of Parabola when Foci and directrix are given, etc. Application questions based on the above. (ii) Ellipse - Cases when a > b and a < b. - Rough sketch of the above. - Major axis, minor axis; latus rectum;	

				coordinates of vertices, focus and centre; and equations of directrices and the axes. - Finding the equation of ellipse when focus and directrix are given. - Simple and direct questions based on the above. - Focal property i.e. SP + SP' = 2a. (iii) Hyperbola - Cases when coefficient y^2 is negative and coefficient of x^2 is negative. - Rough sketch of the above. - Focal property i.e. SP - S'P = 2a. - Transverse and Conjugate axes; Latus rectum; coordinates of vertices, foci and centre; and equations of the directrices and the axes. (iv) Introduction to three-dimensional Geometry Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points and section formula. - As an extension of 2-D - Distance formula. - Section and midpoint from **6. Calculus** **(i) Limits and Derivatives**	

				Derivative introduced as rate of change both as that of distance function and geometrically. Intuitive idea of limit. Limits of polynomials and rational functions trigonometric, exponential and logarithmic functions. 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. • Limits - Notion and meaning of limits. - Fundamental theorems on limits (statement only). - Existence of lim f(x). x → a - Left hand limit , Right hand limit. - Limits of algebraic, trigonometric exponential and logarithmic functions. NOTE: Indeterminate forms are to be introduced while calculating limits. • Differentiation - Meaning and geometrical interpretation of derivative. - Derivatives of simple algebraic and trigonometric functions and their formulae. - Differentiation	

				using first principles. - Derivatives of sum/difference. - Derivatives of product of functions. - Derivatives of quotients of functions. **7. Statistics and Probability** **(i) Statistics** Measures of dispersion: range, mean deviation, variance and standard deviation of ungrouped/grouped data. • Mean deviation about mean. • Standard deviation - by direct method, short cut method and step deviation method. • Combined mean and standard deviation. **(ii) Probability** Random experiments; outcomes, sample spaces (set representation). Events; occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events, Axiomatic (set theoretic) probability, connections with other theories studied in earlier	

				classes. Probability of an event, probability of 'not', 'and' and 'or' events. • Random experiments and their outcomes. • Events: sure events, impossible events, mutually exclusive and exhaustive events. - Definition of probability of an event - Laws of probability addition theorem.	
Physics (Nootan ISC Physics)					
Unit 1: Physical World and Measurement Units and Measurements Measurement: need for measurement; units of measurement; systems of units: fundamental and derived units in SI; measurement of length, mass and time; errors in measurement; significant figures.	**Unit 1:**Physical World and Measurement Units and Measurements Measurement: need for measurement; units of measurement; systems of units: fundamental and derived units in SI; measurement of length, mass and time; errors in measurement; significant figures. Dimensional formulae of physical quantities and	The Kelvin Water-Dropper (Electrostatic Generator) This is a "high-wow" factor project. It uses falling water to generate high-voltage static electricity. It perfectly links Fluid Dynamics.	**Unit 4: Work, Power and Energy** Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power. Potential energy, potential energy of a spring, conservative forces: conservation of mechanical energy (kinetic and potential energies); Conservative and non-conservative forces	**Unit 1:**Physical World and Measurement Units and Measurements Measurement: need for measurement; units of measurement; systems of units: fundamental and derived units in SI; measurement of length, mass and time; errors in measurement; significant figures. Dimensional formulae of physical quantities and constants, dimensional analysis and its applications (a) Importance of measurement in scientific	Piezoelectric Floor Tile (Energy Harvesting) Piezoelectricity is the ability of certain materials to generate an electric spark when mechanically stressed. This links Elasticity.

Dimensional formulae of physical quantities and constants, dimensional analysis and its applications. (a) Importance of measurement in scientific Studies; list of fundamental, supplementary and derived physical quantities; their units and symbols (strictly as per rule); (b) Significant figures; their significance; rules for counting the number of significant figures; rules for (a) addition and subtraction, Dimensions of physical quantities; dimensional formula; express derived units in terms of base units Use of dimensional analysis to (i) check	constants, dimensional analysis and its applications. (a) Importance of measurement in scientific Studies; list of fundamental, supplementary and derived physical quantities; their units and symbols (strictly as per rule); (b) Significant figures; their significance; rules for counting the number of significant figures; rules for (a) addition and subtraction, Dimensions of physical quantities; dimensional formula; express derived units in terms of base units Use of dimensional analysis to (i) check the dimensional correctness of a formula/ equation; **Unit 2:** Kinematics (i) Motion in a Straight Line			Studies; list of fundamental, supplementary and derived physical quantities; their units and symbols (strictly as per rule); (b) Significant figures; their significance; rules for counting the number of significant figures; rules for (a) addition and subtraction, Dimensions of physical quantities; dimensional formula; express derived units in terms of base units Use of dimensional analysis to (i) check the dimensional correctness of a formula/ equation; **Unit 2:** Kinematics (i) Motion in a Straight Line Frame of references, Motion in a straight line (one dimension): Position-time graph, speed and velocity. Elementary concepts of differentiation and integration for describing motion, uniform	

the dimensional correctness of a formula/ equation;	Frame of references, Motion in a straight line (one dimension): Position-time graph, speed and velocity. Elementary concepts of differentiation and integration for describing motion, uniform and non- uniform motion, average speed, velocity, average velocity, instantaneous velocity and uniformly accelerated motion, velocity - time and position - time graphs. Relations for uniformly accelerated motion (graphical treatment). Motion in a Plane Scalar and Vector quantities with examples. Position and displacement vectors,			and non- uniform motion, average speed, velocity, average velocity, instantaneous velocity and uniformly accelerated motion, velocity - time and position - time graphs. Relations for uniformly accelerated motion (graphical treatment). Motion in a Plane Scalar and Vector quantities with examples. Position and displacement vectors, general vectors and their notations; equality of vectors, addition and subtraction of vectors, Unit vector; resolution of a vector in a plane, Various terms related to projectile motion; obtain equations of trajectory, time of flight, maximum height, horizontal range, instantaneous velocity, [projectile motion on an inclined plane not included]. Examples of projectile motion.	

	general vectors and their notations; equality of vectors, addition and subtraction of vectors, Unit vector; resolution of a vector in a plane, Various terms related to projectile motion; obtain equations of trajectory, time of flight, maximum height, horizontal range, instantaneous velocity, [projectile motion on an inclined plane not included]. Examples of projectile motion. **Unit 3: Laws of Motion** General concept of force, inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion.			**Unit 3: Laws of Motion** General concept of force, inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Friction: Static and kinetic friction, laws of friction, rolling friction, lubrication.Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on a level circular road, vehicle on a banked road **Unit 4: Work, Power and Energy** Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power. Potential energy, potential energy of a spring,	

	Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Friction: Static and kinetic friction, laws of friction, rolling friction, lubrication. Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on a level circular road, vehicle on a banked road). **Unit 7: Properties of Bulk Matter** (i) Mechanical Properties of Solids: Elastic behaviour of solids, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity,			conservative forces: conservation of mechanical energy (kinetic and potential energies); Conservative and non-conservative forces **Unit 5:** **Motion of System of Particles and Rigid Body:** Idea of centre of mass: centre of mass of a twoparticle system, momentum conservation and centre of mass motion. Centre of mass of a rigid body; centre of mass of a uniform rod. Moment of a force, torque, angular momentum, laws of conservation of angular momentum and its applications. Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparative study of linear and rotational motions. Moment of inertia, radius of gyration, moments of inertia for simple geometrical	

	Poisson's ratio; elastic energy (qualitative treatment only). **Unit 8: Heat and Thermodynamics** (i) Thermal Properties of Matter: Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; specific heat capacity, calorimetry; change of state, specific latent heat capacity. Heat transfer-conduction, convection and radiation, thermal conductivity, qualitative ideas of Blackbody radiation, Wien's displacement Law and Stefan's law. Thermodynamics Thermal equilibrium and definition of temperature (zeroth law of			objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications. **Unit 6. Gravitation** Kepler's laws of planetary motion, universal law of gravitation. Acceleration due to gravity (g) and its variation with altitude, latitude and depth. Gravitational potential and gravitational potential energy, escape velocity, orbital velocity of a satellite, Geo-stationary satellites. (i) Newton's law of universal gravitation; Statement; unit and dimensional formula of universal gravitational constant, G [Cavendish experiment not required]; gravitational acceleration on surface of the earth (g), weight of a body W= mg from F=ma. (ii) Relation between g and G. Derive the	

	thermodynamics), heat, work and internal energy. First law of thermodynamics, isothermal and adiabatic processes. Second law of thermodynamics: reversible and irreversible processes. (a) Thermal equilibrium and zeroth law of thermodynamics: Self explanatory (b) First law of thermodynamics **Unit 9: Behaviour of Perfect Gases and Kinetic Theory of Gases** (i) Kinetic Theory: Equation of state of a perfect gas, work done in compressing a gas. Kinetic theory of gases - assumptions, concept of pressure. Kinetic interpretation of			expression for variation of g above and below the surface of the earth; graph; mention variation of g with latitude and rotation, (without derivation). **Unit 7: Properties of Bulk Matter** (i) Mechanical Properties of Solids: Elastic behaviour of solids, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity, Poisson's ratio; elastic energy (qualitative treatment only). **Unit 8: Heat and Thermodynamics** (i) Thermal Properties of Matter: Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; specific heat capacity, calorimetry; change of state,	

	temperature; rms speed of gas molecules; degrees of freedom, law of equi-partition of energy (statement only) and application to specific heat capacities of gases; concept of mean free path, Avogadro's number. (a) Kinetic Theory of gases; derive p			specific latent heat capacity. Heat transfer-conduction, convection and radiation, thermal conductivity, qualitative ideas of Blackbody radiation, Wien's displacement Law and Stefan's law. Thermodynamics Thermal equilibrium and definition of temperature (zeroth law of thermodynamics), heat, work and internal energy. First law of thermodynamics, isothermal and adiabatic processes. Second law of thermodynamics: reversible and irreversible processes. (a) Thermal equilibrium and zeroth law of thermodynamics: Self explanatory (b) First law of thermodynamics **Unit 9: Behaviour of Perfect Gases and Kinetic Theory of Gases** (i) Kinetic Theory: Equation of state of a perfect	

				gas, work done in compressing a gas. Kinetic theory of gases - assumptions, concept of pressure. Kinetic interpretation of temperature; rms speed of gas molecules; degrees of freedom, law of equi-partition of energy (statement only) and application to specific heat capacities of gases; concept of mean free path, Avogadro's number. (a) Kinetic Theory of gases; derive p **Unit 10: Oscillations and Waves** (i) Oscillations: Periodic motion, time period, frequency, displacement as a function of time, periodic functions. Simple harmonic motion (S.H.M) and its equation; phase; oscillations of a spring, restoring force and force constant; energy in S.H.M., Kinetic and potential energies; simple pendulum and	

				derivation of expression for its time period. Simple harmonic motion. Periodic motion, time period T and frequency f, f=1/T; uniform circular motion and its projection on a diameter defines SHM; displacement, amplitude, phase and epoch, velocity, acceleration, time period; characteristics of SHM; Relation between linear simple harmonic motion and uniform circular motion. Differential equation of SHM,	
Chemistry (Nootan ISC Chemistry)					
1. Some Basic Concepts of Chemistry General introduction: Importance and scope of chemistry. Study of matter. Understanding laws of chemical combination. Dalton's atomic	**(Including UT-I) 3. Classification of Elements and Periodicity in Properties Significance of classification;** study of Mendeleev's periodic law and its limitations; Modern Periodic Law and the present form of	Make a project on Natural polymers (any five) - structure, characteristics, uses. Synthetic polymers (any five) - method of preparation, structure, characteristics and uses.0	**6. Equilibrium** (i) Chemical Equilibrium. Introduction of physical and chemical equilibrium and its characteristics Dynamic nature of equilibrium, law of mass action, equilibrium constant and factors affecting	**8. Organic Chemistry - Some Basic Principles and Techniques** General introduction, classification and IUPAC nomenclature of organic compounds and isomerism. Methods of purification, qualitative and quantitative analysis. Electron displacement in a covalent bond: inductive effect, electromeric effect,	Make a project on Chemicals in medicines: antiseptics, antibiotics, antacids, etc. and their uses.

theory: concept of elements, atoms and molecules. Isotopic (atomic) and molecular masses, mole concept and molar mass, percentage composition, empirical and molecular formula. Stoichiometry and calculations based on chemical reactions. (i) Precision and accuracy: Quantities and their measurements in Chemistry, significant figures, SI units. (ii)Dimensional analysis: Conversion of units, numericals and applications of units. (iii)The concept of atoms having fixed properties in explaining the laws of chemical combination. Study about atoms.	periodic table leading to periodic trends in properties of elements - atomic radii, ionic radii, valency, ionisation enthalpy, electron gain enthalpy, electronegativity. Nomenclature of elements with atomic number greater than 100. (i) Modern Periodic Law. Mendeleev's periodic law, defects in the Mendeleev's periodic table. Advantages and disadvantages. Modern periodic law (atomic number taken as the basis of classification of the elements). (ii) Long form of Periodic Table. General characteristics of groups and periods. Division of periodic table as s, p, d and f blocks. IUPAC nomenclature for elements with Z> 100. (iii) Periodic trends in properties of		equilibrium. Le Chatelier's principle and its applications. Irreversible and reversible reactions. Physical equilibrium: solid-liquid, liquid-vapour, solid-vapour; Characteristics of Physical equilibrium. Chemical equilibrium: Characteristics of chemical equilibrium; dynamic nature. Law of mass action; Equilibrium constant in terms of concentration Kc. Gaseous reactions; Equilibrium constant in terms of partial pressures Kp. Relationship between Kp and Kc (derivation required); Characteristics of equilibrium constant; Units for equilibrium constant; Simple calculations of equilibrium constant and concentration. The following examples should be considered to show	resonance and hyperconjugation. Homolytic and heterolytic bond fission of a covalent bond: free radicals, carbocations, carbanions, electrophiles and nucleophiles, types of organic reactions (i) Introduction to organic chemistry: Vital force theory, reason for separate study of organic chemistry and its importance, characteristics of carbon atoms (tetra valency), Reasons for large number of organic compounds: catenation, isomerism and multiple bonding, etc. (ii) Classification of organic compounds: (definition and examples): open chain, closed chain, homocyclic, hetrocyclic, aromatic, alicyclic compounds, homologous series and its characteristics, functional groups. (iii)IUPAC rules for naming organic compounds. Aliphatic, alicyclic and aromatic compounds. (iv) Definition and classification of isomerism: Structural	

Dalton's atomic theory: Main postulates of the theory; its limitations. Laws of chemical combinations: • Law of conservation of mass. • Law of definite proportions. • Law of multiple proportions. • Law of reciprocal proportions. • Gay Lussac's law of gaseous volumes. Statement, explanation and simple problems based on these laws. (iv) Atomic (isotopic masses) and molecular mass. Relative molecular mass and mole: The atomic mass unit is one of the experimentally determined unit. It is equal to 1/12 of the mass of the carbon 12 isotope.	elements. Atomic radius, ionic radius, ionisation enthalpy, electron gain enthalpy, electronegativity, metallic and non-metallic characteristics. • Periodic properties such as valence electrons, atomic and ionic radii and their variation in groups and periods. • The idea of ionisation enthalpy, electron gain enthalpy and electronegativity must be given and their variation in groups and periods may be discussed. • The factors (atomic number, screening effect and shielding effect, the number of electrons in the outermost orbit) which affect these periodic properties and their variation in groups and periods. (iv) Periodic trends in chemical properties –		maximum yield of products: - Synthesis of ammonia by Haber's process. - The dissociation of dinitrogen tetra oxide. - Hydrolysis of simple esters. - The contact process for the manufacture of sulphuric acid. Le Chatelier's Principle. Statement and explanation. Factors affecting chemical and physical equilibria should be discussed in the light of Le Chatelier's principle. - Change of concentration. - Change of temperature. - Change of pressure. - Effect of catalyst. - Addition of inert gas. (ii) Ionic equilibrium Introduction, electrolyte (strong and weak), non-electrolyte, ionisation, degree of ionisation of polybasic acids, acid strength, concept of pH, pH indicators,	isomerism: definition, classification, examples. Chain isomerism, Positional isomerism, Functional isomerism, Metamerism, Tautomerism - examples for each of the above. Stereoisomerism: definition and classification, examples. Geometrical isomerism: Definition. Conditions for compounds to exhibit geometrical isomerism; types and examples, cis and trans, syn and anti. Examples. Optical isomerism: Definition, Nicol prism, plane polarised light. polarimeter. Method of measuring angle of rotation. Specific rotation. Conditions for optical activity. d, l form; External compensation, Internal compensation, racemic mixture & meso form. Examples – lactic acid and tartaric acid. (v) Analysis of organic compounds: Detection of elements (qualitative analysis) such as carbon, hydrogen, nitrogen, halogens and sulphur should be	

Numerical problems based on mole concept, Avogadro's number and gram molecular volume. (v) Empirical and molecular formula: Numericals based on the above. (vi) Chemical equivalents, volumetric calculations in terms of normality. C = 12.00 should be taken as a standard for expressing atomic masses. Equivalent weight expressing the combining capacity of the elements with the standard elements such as H, Cl, O, Ag, etc. Variable equivalent weight. Gram equivalent weights, relationship between gram equivalent weight, gram molecular mass and valency. Determination of	periodicity of valence or oxidation states. Anomalous properties of second period elements. Diagonal relationship; acidic and basic nature of oxides. **4. Chemical Bonding and Molecular structure** Valence electrons, ionic bond character, covalent bond of ionic bond, covalent bond, bond parameters, lewis structure, polar character of covalent bond, VSEPR theory, geometry of covalent molecules, valence bond theory, concept of hybridisation involving s, p and d orbitals and shapes of some simple molecules. Coordinate bond. Molecular orbital theory of homonuclear diatomic molecules (qualitative idea		buffer solution, common ion effect (with illustrative examples). Henderson equation, hydrolysis of salts, solubility and solubility product. Ostwald's dilution law and its derivation. Strength of acids and bases based on their dissociation constant. Problems based on Ostwald's dilution law. Arrhenius, Brönsted-Lowry and Lewis concept of acids and bases, multistage ionisation of acids and bases with examples. Ionic product of water – definition, pH, pOH, pKw of solutions. pH indicators and their choice in titrimetry. Numericals on the above concepts. Common ion effect – definition, examples (acetic acid and sodium acetate; ammonium hydroxide and ammonium	considered by using Lassaigne's test and reactions involved in it. (vi) Estimation of carbon, hydrogen, nitrogen, halogens, sulphur and phosphorous: Estimation of carbon and hydrogen – Leibig's method. Estimation of nitrogen - Kjeldahl's method. Estimation of halogens sulphur and phosphorous - Carius method. Numericals included. Experimental details required. (vii) Types of chemical reactions and their mechanisms. Substitution, addition, elimination reactions: definition and examples. Homolytic and heterolytic fission – definition and examples. Free radicals, carbocation, carbanion (their reactivities and stabilities). Electrophiles and nucleophiles – definition and examples (including neutral electrophiles and nucleophiles). Inductive, electromeric, mesomeric effect and hyperconjugation – definition, examples.	

equivalent weight of acids, alkalis, salts, oxidising and reducing agents. (experimental details not required). Terms used in volumetric calculations such as percentage (w/w and w/v), normality, molarity, molality, mole fraction, etc. should be discussed. Students are required to know the formulae and normality and molarity equations. Simple calculations on the above topics. (vii) Chemical reactions – stoichiometric calculations based on mass-mass, mass-volume, volumevolume relationships and limiting reagent. **2. Structure of Atom Discovery of fundamental**	only). Resonance and hydrogen bond. (i) Kossel-Lewis approach to chemical bonding. Octet rule, its application to electrovalent and covalent bonds. (ii) Electrovalent or ionic bond: Lewis structures of NaCl, Li2O, MgO, CaO, MgF2, and Na2 S. Definition of ionic bond. The conditions necessary for the formation of ionic bonds such as: - low ionisation enthalpy of metals. - high electron gain enthalpy of non-metals. - high lattice energy. - electronegativity difference between the reacting atoms. All these points must be discussed in detail. The formation of cations and anions of elements and their positions in the periodic table. Variable		chloride), applications in salt analysis. Salt hydrolysis – salts of strong acids and weak bases, weak acids and strong bases, weak acids and weak bases and the pH formula of the solutions of these salts in water with suitable examples. Buffer solutions: definition, examples, action; its interpretations based on Le Chatelier's principle. Henderson equation. Solubility product: definition and application in qualitative salt analysis (Group II, III and IV cations). Numericals on pH, buffer solutions, solubility and solubility product. **7. Redox Reactions** Concept of oxidation and reduction, redox reactions, oxidation number, change in oxidation number,	(viii)Free radicals and polar mechanisms In terms of fission of the bonds and formation of the new bonds including SN1, SN2, E1 and E2 mechanisms. Explain with relevant examples and conditions **9. Hydrocarbons** Classification of Hydrocarbons I. Aliphatic Hydrocarbons (i) Alkanes - Nomenclature, isomerism, conformation (methane and ethane), physical properties, chemical properties including free radical mechanism of halogenation, combustion and pyrolysis. Occurrence, conformation (Sawhorse and Newman projections of ethane). General methods of preparation: from sodium salts of carboxylic acids (decarboxylation and Kolbe's electrolytic method); from alcohols and alkyl halides (Wurtz reaction, Coreyhouse Synthesis). From aldehydes and Grignard's Reagent. Physical and chemical properties of alkanes.	

particles (electron, proton and neutron), atomic number, isotopes and isobars. Thomson's model and its limitations. Rutherford's experimental model and its limitations. Dual nature of matter and light. Bohr's atomic model and its limitations (de Broglie's equation, Heisenberg's uncertainty principle), concept of shells, subshells, orbitals. Quantum numbers, shapes of s, p and d orbitals. Rules for filling electrons in orbitals - aufbau principle, Pauli's exclusion principle and Hund's rule of maximum multiplicity. Electronic configuration of atoms, stability of	electrovalency; reasons for variable electrovalency i.e, due to inert electron pair effect and unstable core, by using suitable examples. Calculation of lattice enthalpy (Born-Haber cycle). Characteristics of electrovalent bond. (iii) Covalent Bond – Bond parameters, Lewis structure, polar character of covalent bond, shapes. Sigma and pi bonds e.g. formation of ammonia, nitrogen, ethene, ethyne, and carbon dioxide. Definition of covalent bond, conditions for formation of covalent bonds, types of covalent bonds, i.e single, double and triple bonds. Sigma and pi bonds: H2, O2, N2. Classification of covalent bonds based on electronegativity of		balancing redox reactions (in terms of loss and gain of electrons). Applications of redox in various types of chemical reactions. – Concept of oxidation and reduction in terms of oxygen, hydrogen, electrons. – Redox reactions – examples. – Oxidation number: rules for calculation, simple calculations of oxidation state in molecules and ions like K2Cr2O7, S2 2 O3 – , etc. – Oxidation and reduction in terms of change in oxidation number. – Balancing of redox reactions in acidic and basic medium by oxidation number and ion-electron method.	Physical properties: state, freezing point, melting point, boiling point, density. Chemical properties: combustibility, reaction with chlorine (free radical mechanism), reaction with oxygen in presence of catalyst (formation of alcohol, aldehyde, and carboxylic acid). Cyclisation, aromatisation, isomerisation and pyrolysis. Uses of alkanes. (ii) Alkenes - Nomenclature, structure of double bond (ethene), isomerism; methods of preparation; physical properties, chemical properties; addition of hydrogen, halogen, water, hydrogen halides (Markownikoff's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition. General methods of preparation – dehydration of alcohols, dehydrohalogenation of alkyl halides (from vicinal dihalides), Kolbe's electrolytic method and from alkynes. Physical Properties: State, freezing	

half- filled and completely filled orbitals. (i) Subatomic particles (electrons, protons and neutrons) their charges and masses: Concept of indivisibility of atom as proposed by Dalton does not exist. The atom consists of subatomic fundamental particles. Production of cathode rays and their properties. Production of anode rays and their properties. Chadwick's experiment for the discovery of neutron and properties of neutron. (ii) Rutherford's nuclear model based on the scattering experiment: Rutherford's	atoms - polar and non-polar covalent bond, dipole moment. Formation of CH4, NH3, H2O, ethane, ethene, ethyne and CO2, etc. and their electron dot structure or Lewis structure. Characteristics of covalent compounds. Comparison in electrovalency and covalency. Reason for variable covalency e.g. Phosphorus 3 & 5 and sulphur 2, 4, 6 & chlorine 1, 3, 5 and 7. Formal charge of ions. (iv) Deviation from octet rule and Fajan's rules. Definition of octet rule. Failure of octet rule, due to either incomplete octet or exceeding of octet with suitable examples. Fajan's rules: statements, conditions for electrovalency and covalency. Polar and non polar bonds			point, melting point, boiling point, dipole moment, density. Chemical properties - addition reactions (hydrogen, halogens, hydrogen halides, sulphuric acid, water). Markownikoff's rule and anti-Markownikoff's rule with mechanism and examples. Oxidation: complete combustion, hot and cold alkaline KMnO4 (Baeyer's reagent), ozonolysis. Polymerisation. Saytzeff's rule and its application. Uses of alkenes. (iii) Alkynes - Nomenclature, structure of triple bond (ethyne), methods of preparation; physical properties, chemical properties: acidic character of alkynes, addition reactions - hydrogen, halogens, hydrogen halides and water. General methods of preparations of alkynes. Manufacture of ethyne by calcium carbide and from natural gas. Dehydrohalogenation and Kolbe's electrolytic method. Physical	

scattering experiment. Discovery of nucleus. Rutherford's nuclear model of atom. Defects of Rutherford's model. Electromagnetic wave theory and its limitations (Black body radiation and photoelectric effect). Planck's quantum theory. Numericals based on the above. (iii) Types of spectra: emission and absorption spectra. Band and line spectra to be discussed. (iv) Bohr's atomic model. Postulates of Bohr's theory – based on Planck's quantum theory. Merits of Bohr's atomic model and explanation of hydrogen spectra. Calculations based on Rydberg's	should be correlated with Fajan's rules. (v) Valence Shell Electron Pair Repulsion (VSEPR) Theory; Hybridisation and shapes of molecules: hybridisation involving s, p and d orbitals only. Concept of electron-pair repulsion and shapes of molecules using suitable examples. Hybridisation and molecular shapes – definition, hybridisation of orbitals involving s, p and d orbitals (using suitable examples). (vi) Molecular orbital theory: Qualitative treatment of homonuclear diatomic molecules of first two periods (hydrogen to neon), Energy level diagrams, bonding and antibonding molecular orbitals, bond order,			properties of alkynes: State of existence, freezing point, melting point, boiling point, density. Chemical properties of alkynes – addition reactions (hydrogen, halogens, hydrogen halides and water), acidic nature of alkynes, formation of acetylides. Oxidation: complete combustion, hot and cold alkaline KMnO4 (Baeyer's reagent), ozonolysis. Polymerisation. Uses of alkynes. Distinguishing test between Alkane, Alkene and Alkyne. **10. Aromatic Hydrocarbons** Introduction, IUPAC nomenclature, benzene: resonance, aromaticity, chemical properties: mechanism of electrophilic substitution. Nitration, sulphonation, halogenation, Friedel Crafts alkylation and acylation, directive influence of functional group in monosubstituted benzene. Carcinogenicity and toxicity. Structure:	

formula. Numericals on Bohr's atomic radii, velocity and energy of orbits (derivation not required). Defects in Bohr's Model. (v) Quantum mechanical model of an atom - a simple mathematical treatment. Quantum numbers; shape, size and orientation of s, p and d orbitals only (no derivation). aufbau principle, Pauli's exclusion principle, Hund's rule of maximum multiplicity. Electronic configuration of elements in terms of s, p, d, f subshells. • de Broglie's equation. Numericals. • Heisenberg's Uncertainty Principle. Numericals.	paramagnetism of O2 molecule. Relative stabilities of O2, O2 - , O2 2 - , O2 + and N2, N2 +, N2 - , N2 2-. (vii) Co-ordinate or dative covalent bond, e.g. formation of oxy-acids of chlorine: Co-ordinate or dative covalent bonding: definition, formation of chlorous acid, chloric acid, perchloric acid, ammonium ion, hydronium ion, nitric acid, ozone. (viii) Resonance in simple inorganic molecules: Resonance in simple inorganic molecules like ozone, carbon dioxide, carbonate ion and nitrate ion. (ix) Hydrogen bonding: the examples of hydrogen fluoride, water (ice), alcohol, etc. may be considered. H-bonding – definition, types, condition for hydrogen bond formation, examples			Resonance structures (Kekule's) of benzene. Benzene: Preparation from sodium benzoate and from phenol. Physical properties: State of existence, freezing point, melting point, boiling point, density. Chemical properties: - Electrophilic substitution reactions with mechanism (halogenation, nitration, sulphonation). - Alkylation, acetylation – Friedel Crafts reaction. - Directive influence (o-, p-, and m-) of substituents in electrophilic and nucleophilic substitutions (with mechanism). - Oxidation: catalytic oxidation, reaction with ozone. - Addition reactions with hydrogen, chlorine, bromine. - Pyrolysis (formation of bi-phenyl).	

• Schrodinger Wave Equation – physical significance of Ψ and $\|\Psi\|^2$. • Quantum numbers – types of quantum numbers, shape, size and orientation of the s, p and d subshells. Information obtained in terms of distance of electron from the nucleus, node, nodal planes and radial probability curve, energy of electron, number of electrons present in an orbit and an orbital. • Aufbau principle, (n+l) rule. • Pauli's exclusion principle. • Hund's rule of maximum multiplicity. • Electronic configuration of elements and ions in terms of s, p, d, f subshells and stability of halffilled	of inter-molecular hydrogen bonding in detail taking hydrogen fluoride, water and ice and ethanol into account. Intramolecular hydrogen bonding. **5. Chemical Thermodynamics** (i) Introduction, concepts, types of system, surroundings, extensive, intensive properties and state functions. Types of system – ideal system, real system, isolated system, closed system, open system. Meaning of surroundings. Properties of the system: macroscopic, intensive and extensive properties. State of the system. Main processes the system undergoes: reversible, irreversible, adiabatic, isothermal,				

and completely filled orbitals.	isobaric, isochoric, cyclic. Meaning of thermodynamic equilibrium. Meaning of thermodynamic process. (ii) First Law of Thermodynamics and its significance, work, heat, internal energy, enthalpy (ΔU or ΔE and ΔH), heat capacity and specific heat. Hess's law of constant heat summation, enthalpy of bond dissociation, combustion, formation, atomisation, sublimation, phase transition, ionisation, solution and dilution. Meaning of: internal energy of the system, work done by the system, by the surroundings at constant temperature, heat absorbed by the system and by the surroundings at constant temperature. The sign convention for				

	change in internal energy, heat given out or gained, work done by the system or by the surroundings. State function and path function - meaning with examples. Internal energy change, work done and heat absorbed in a cyclic process. Internal energy change in an isolated system and in a non-isolated system. Total internal energy change of a system and surroundings. Mathematical statement of the first law. Significance of first law of thermodynamics. Need for enthalpy – constant pressure or open vessel processes. Enthalpy - a thermodynamic property, state function. Mathematical form of enthalpy. Heat - the energy in transit.				

	Conditions for the transfer of heat. Limitations in conversion of heat into work. Condition at which heat transfer ceases, unit of heat.Meaning of work, capacity to do work, types of work. Mathematical form of reversible work and irreversible work. Difference between the reversible and irreversible work done – graphically. Relationship between Cv and internal energy change. Relationship between Cp and Cv. Definitions of the following: Heat of reaction: Heat of formation – standard heat of formation, Heat of solution, Heat of dilution, Heat of neutralization, Heat of combustion. Constancy in the heat of neutralisation: Experimental verification in case of				

	strong acids and strong bases. Reason for that observation – ionic neutralisation and the heat evolved. Definition of Calorific value of a fuel. Statement of Hess' Law and its application. Problems based on Hess' Law. (iii)Second Law of Thermodynamics and its significance, spontaneity of a chemical change; Entropy, Free Energy. Inadequacy of First Law and need for Second Law; Ideas about reversible (recapitulation), spontaneous and non-spontaneous processes. Meaning of entropy – derived from Second Law – statement of Second Law in terms of entropy; Physical significance of entropy; State function and not path function. Entropy				

	change of the universe, reversible isothermal process and irreversible process. Meaning of thermal death, Gibb's free energy of the system and Helmholtz free energy. Relationship between Gibb's free energy and Helmholtz's free energy. Relationship between change in Gibb's free energy and equilibrium constant of a chemical reaction. Defining the criteria for spontaneity of a chemical change in terms of Gibb's free energy. Note: Numericals based on the First Law, Second Law of Thermodynamics and Hess' Law. (iv) Third Law of Thermodynamics – statement only.				

Biology (Shri Balaji- ISC Biology)					
1. Diversity of Living Organisms **(i) The Living World** Need for classification; taxonomy and systematics; concept of species and taxonomical hierarchy; binomial nomenclature. Need for classification should be discussed. Definition and explanation of the terms taxonomy (numerical taxonomy, cytotaxonomy and chemotaxonomy) and systematics. Concept of species. Major taxonomical hierarchies (phylum, class, order, family, genus, species): definition and examples with	**Including Unit Test I syllabus** **1. Diversity of Living Organisms** (iii) Plant Kingdom (a) Algae - characteristics (morphology, common name, major pigments, stored food, composition of cell wall, flagellar number and position of insertion, habitat, mode of sexual reproduction) and examples of Chlorophyceae, Phaeophyceae, Rhodophyceae; Economic importance of algae – any five. (b) Bryophyta – general characteristics, distinctive features of liverworts and mosses; graphic outline of life cycle of Funaria with	Prepare a comprehensive project on the human endocrine system and its disorders, including causes, symptoms, hormonal imbalance, and management of conditions such as Diabetes Mellitus and Hyperthyroidism. The project should include a case study and data collection/survey.	**4. Plant Physiology** **(i) Photosynthesis in higher plants** Photosynthesis as a mean of autotrophic nutrition; site of photosynthesis, pigments involved in photosynthesis (elementary idea); photochemical and biosynthetic phases of and non-cyclic photosynthesis; cyclic photophosphorylation ; chemiosmotic hypothesis; photorespiration; C3 and C4 pathways; factors affecting photosynthesis. Differences between absorption and action spectra. Brief idea of photosynthetic pigments (difference between chlorophyll ‘a’&‘b’, carotenoids	**Including Half Yearly & Unit Test II syllabus** **4. Plant Physiology** **(iii) Plant Growth and Development** Seed germination; phases of plant growth; plant growth rate; differentiation, dedifferentiation and redifferentiation; sequence of developmental processes in a plant cell; growth regulators - auxin, gibberellin, cytokinin, ethylene, ABA. Definition of hypogeal, epigeal and viviparous germination with two examples of each. A brief idea about differentiation, dedifferentiation and redifferentiation. Phases of growth in meristems, growth rate definition; measurement of growth by direct method and use of auxanometer, factors affecting growth. Discovery and physiological role of	Prepare a Project on “Yeast Fermentation and Production of Alcohol” covering the process of Fermentation, role of Yeast, biochemical changes involved, conditions required, and industrial applications. Project to include experiment/ observation, diagrams, and analysis.

reference to classification of man, house fly, mango and wheat. Rules of binomial nomenclature and advantages of using scientific names. Three systems of classification – artificial, natural and phylogenetic. (ii) **Biological Classification** Three domains of life; Five kingdom classification; salient features and classification of Monera, Protista, Fungi, Plantae and Animalia. Lichens, Viruses, Viroids and Prions. (a) Three domains of life – distinguishing features of (archaea, bacteria, eukarya). Five-kingdom system of classification and characteristics of different kingdoms	reference to alternation of generations. Economic importance of bryophytes. (c) Pteridophyta: characteristics; classification into classes: psilopsida (Psilotum), lycopsida (Selaginella, Lycopodium), sphenopsida (Equisetum) and pteropsida (Dryopteris, Pteris and Adiantum). Graphic outline of life cycle of a typical pteridophyte (fern). Definition of homospory and heterospory with relevant examples. Economic importance. (d) Gymnosperms: general characteristics and graphic outline of life cycle of a typical gymnosperm (Pinus). Economic importance.		and xanthophyll), photochemical phase - pigment systems, cyclic and non-cyclic photophosphorylation , chemiosmotic hypothesis; biosynthetic phase - C3 cycle – graphic representation in correct sequence (carboxylation, glycolytic reversal and regeneration of pentose); Kranz anatomy, graphic representation of C4 cycle (Hatch and Slack pathway); Differences between C3 and C4 plants, C3 and C4 cycles, Photosystems I and II, Photorespiration pathway in brief; significance of photorespiration; explanation of how RuBP carboxylase acts as RuBP oxygenase. Blackman's Law of limiting factors, factors affecting photosynthesis (light,	growth regulators in plants (such as auxins,gibberellins, cytokinins, ethylene and abscisic acid – four effects of each); application of growth regulators. **5. Human Physiology** **(i) Breathing and exchange of gases.** Respiratory organs in animals (recall only); Respiratory system in humans; mechanism of breathing - exchange of gases, transport of gases and regulation of breathing, respiratory volumes; disorders related to respiration. Organs involved in respiration; mechanism of pulmonary gas exchange; breathing process should be explained showing the action of diaphragm and intercostal muscles, regulation of breathing ; transport of oxygen in the blood, oxyhaemoglobin dissociation curve; transport of CO_2; chloride shift, pulmonary air	

with examples. (b) Kingdom Monera: Bacteria - General structure of a typical bacterial cell; classification of bacteria according to shape, nutrition and mode of respiration; differences between gram +ve and gram–ve bacteria; types of reproduction definition of fission, conjugation, transduction and transformation (details not required). A brief idea of the role of different types of archaebacteria (methanogens, halophiles and thermoacidophiles in their extreme environments). Mycoplasma – three distinctive features. Economic importance with reference to role of bacteria in sewage	**(iv) Animal Kingdom** **Animal Kingdom:** levels of organisation (cellular level, tissue level, organ level, organ system level); body plan (cell aggregate plan, blind-sac plan and tube-within-tube plan), symmetry (spherical, radial and bilateral symmetry), (diploblastic and triploblastic organisation in animals, coelom development (acoelomate, pseudocoelomate, coelomate and haemocoelomate), segmentation. **Non-chordata** - five distinguishing characters with two examples of Porifera, Cnidaria, Ctenophora, Platyhelminthes, Nematoda (Aschelminthes),		CO2, temperature, and water). **(ii) Respiration in Plants** Exchange of gases; cellular respiration glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); energy relations - number of ATP molecules generated; amphibolic pathways; respiratory quotient. Types of respiration; mechanism of respiration: glycolysis, Krebs' cycle, ETS (only flowchart). Oxidative phosphorylation– definition; Brief idea of fermentation and Amphibolic pathway. Definition of respiratory quotient and RQ values of carbohydrates, proteins and fats.	volumes and lung capacities; disorders of respiratory system such as asthma, emphysema, respiratory disorders. **(ii) Body fluids and circulation.** Composition of blood, blood groups, coagulation of blood; composition of lymph and its functions; human circulatory system-structure of human heart and blood vessels; cardiac cycle, cardiac output, ECG; double circulation; regulation of cardiac activity; disorders of circulatory system. Composition of blood plasma, functions of plasma proteins, blood corpuscles. Importance of ABO groups in blood transfusion, Rh factor and its importance in transfusion and pregnancy; clotting of blood to be taught briefly; lymphatic system – a brief idea of lymph (composition and function), Difference between closed and open	

treatment, antibiotics, energy production and house hold products (curd and cheese only). (c) Kingdom Protista – only two general characteristics and of subgroups: (ii) Dinoflagellates, (i) two examples Chrysophytes (iii) Euglenoids, (iv) Slime moulds, (v) Protozoans (to be studied under rhizopods, flagellates, ciliates and characteristics sporozoans with two including modes of locomotion and two examples of each). (d) Kingdom Fungi: general characteristics and mode of reproduction of each (including types of spores and sexual reproduction – definition of	Annelida, Mollusca, Arthropoda, Echinodermata, Hemichordata. **Chordata –** sub-classification of Chordata with reference to notochord - sub phyla Urochordata, Cephalochordata. Vertebrata (classes – cyclostomata, chondrichthyes, osteichthyes, amphibia, reptilia, aves and mammalia) – three distinguishing characters with two examples of each). **2. Structural Organisation in Animals and Plants** **(i) Morphology of Flowering Plants** (a) Morphology and modifications of root, stem, leaf. Types of roots (tap, fibrous, adventitious), regions, modifications of roots			vascular system; external and internal structure of heart; working of the heart and blood flow through the heart during different phases should be described under the following headings - auricular systole, auricular diastole, ventricular systole, ventricular diastole and joint diastole; definition of stroke volume and cardiac output, regulation of heart beat, ECG; arterial blood pressure (systolic and diastolic), double circulation. The internal structure of artery, vein and capillary. Importance of ABO groups in blood transfusion, Rh factor and its importance in transfusion and pregnancy; clotting of blood to be taught briefly; lymphatic system – a brief idea of lymph (composition and function), lymphatic capillaries and lymph nodes; disorders of the circulatory system such as hypertension, coronary artery disease, angina pectoris and heart failure.	

isogamy, anisogamy, oogamy, plasmogamy, karyogamy Zygomycetes, Basidiomycetes, and dikaryophase). Ascomycetes, Deuteromycetes characteristics with examples. Role of fungi in the field of medicine, bakery and environmental decomposition. Definition of lichens and mycorrhiza (ecto and endo). Life cycles not required. (e) Virus (characteristic features – link between living and non-living, structure of TMV and bacteriophage and contribution of the following scientists: D.J. Ivanowsky, M.W. Beijerinck, W.M. Stanley). Definitions of Viroid	for storage (Tuberous – e.g. Mirabilis and sweet potato; fusiform – e.g. radish; conical e.g., carrot; napiform – e.g. turnip), respiration (pneumatophores) and support (stilt and prop). Stems – features (nodes internodes, buds), modifications – underground (tuber, rhizome, corm) aerial (tendril, thorn, Phylloclade, cladode) and sub-aerial (runner, sucker, stolon, offset). Leaves - parts of a simple leaf, venation, types of leaves (simple and compound – pinnate and palmate), phyllotaxy – alternate, opposite, whorled (with an example of each). Modifications for mechanical support (tendril), protection (spine), storage (bulb), reproduction			(iii) Excretory products and their elimination. Modes of excretion - ammonotelism, ureotelism, uricotelism; human excretory system - structure and function; urine formation, osmoregulation; regulation of kidney function, renin - angiotensin, atrial natriuretic factor, ADH; role of erythropoietin; role of other organs in excretion; disorders of the excretory system- uraemia, renal failure, renal calculi, nephritis; dialysis and artificial kidney, kidney transplant. Define, differentiate and explain the terms ammonotelism, ureotelism and uricotelism; external and internal structure of the kidney (L.S.); structure of nephron; physiology of urine formation - ultra filtration, selective reabsorption and active (tubular) secretion. Counter current system, regulation of urine formation, definition and	

and Prions (examples of the diseases caused by prions – BSE and CJD).	(Bryophyllum); insectivorous (pitcher plant, Venus-fly-trap). plants (b) Morphology of flower. Structure of a typical flower, types of inflorescence (racemose and cymose). Structure of a typical bracteates/ebracteate, flower, [symmetry (actinomorphic, zygomorphic), trimerous/tetramerous/pentamerous complete/ incomplete, whorls (calyx: non-essential gamosepalous, polysepalous, corolla: gamopetalous, polysepalous, perianth, aestivation: valvate, twisted, imbricate, vexillary), essential whorls (androecium: cohesion syngenesious, synandrous, monadelphous, diadelphous, polyadelphous;			regulation of micturition, renin-angiotensin-aldosterone system, role of atrial natriuretic factor, ADH and erythropoietin. Role of skin, liver and lungs in excretion. Homeostasis – definition. Disorders of the excretory system - uraemia, renal failure, renal calculi, nephritis. Haemodialysis; Kidney transplant. **(iv) Locomotion and Movement** Types of movement - ciliary, flagellar, muscular; skeletal muscles - contractile proteins and muscle contraction; skeletal system and its functions; joints; disorders of muscular and skeletal system. Locomotion: Basic aspects of human skeleton (number and names of the bones of axial and appendicular skeleton). Functions of human skeleton; different types of joints - their location and function; general properties of muscles; structure of	

	adhesion – epipetalous, epiphyllous; number of lobes – monothecous, dithecous; Gynoecium: position of ovary – epigynous, hypogynous, perigynous, cohesion – apocarpous, syncarpous, number of locules – unilocular, bilocular, multilocular, placentation – axile, marginal, parietal, free central, basal; types of inflorescence (racemose and cymose – definition, examples, and differences; subtypes not required). **(ii) Anatomy of Flowering Plants** **Plant Tissues:** types of plant tissues: Meristematic tissues: classification of meristematic tissue. Permanent Tissues: structure and function of simple			skeletal muscle - sliding filament theory of muscle contraction; chemical events during muscle contraction; definition of summation, tetanus, rigor mortis, differences between red and white muscles. Disorders of muscular and skeletal system: (i) Myasthenia gravis, (ii) Tetany, (iii) Muscular dystrophy, (iv) Arthritis, (v) Osteoporosis, (vi) gout. (**v) Neural Control and Coordination** Neuron and nerves; nervous system in humans - central nervous system; peripheral nervous system and visceral nervous system; generation and conduction of nerve impulse. Types of neurons – (unipolar, bipolar. Pseudounipolar and multipolar), Structure and functions of various parts of the brain and spinal cord; conduction of nerve	

	tissues (parenchyma, collenchyma and sclerenchyma) and complex tissues (xylem and phloem), tissue system. Internal structure of root, stem, and leaf Characteristics of meristematic tissue; classification of meristems based on origin and location; structure, function and location of permanent tissues; simple and complex tissues; epidermal, ground and vascular tissue systems. Cellular diagrams of T.S. of roots and stem and V.S. of monocot and dicot leaves are required. **(iii) Structural Organisation in Animals: Frog** Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, excretory,			impulses through nerve fibre (non- myelinated and myelinated) and through synapse. **(vi) Chemical Co-ordination and Integration** Human endocrine system - hypothalamus, pituitary, pineal, thymus, thyroid, parathyroid, adrenal, GI tract, pancreas, gonads; mechanism of hormone action (elementary idea); role of hormones as messengers and regulators, hypo - and hyperactivity and related disorders; dwarfism, acromegaly, cretinism, goiter, exophthalmic goiter, diabetes mellitus and diabetes insipidus, Grave's disease, Addison's disease. Brief idea of location of endocrine glands; role of hypothalamus; hormones secreted by different lobes of pituitary and their functions; feedback control of tropic hormones to be discussed giving examples; hormones of pineal, thymus, thyroid,	

	nervous and reproductive) of frog a brief account only. **.3. Cell: Structure and Function** **(i) Cell - the Unit of Life** Cell theory and cell as the basic unit of life: Structure of eukaryotic cells; Plant cell and animal cell; cell envelope; cell membrane, cell wall; cell organelles – ultrastructure and function; endomembrane system, mitochondria, ribosomes, plastids, microbodies; cytoskeleton, cilia, flagella, centrioles; nucleus. Historical aspects, cell theory, size and shape of cells. General structure of eukaryotic cell, ultra structure and function of cell wall (including definition			parathyroid, pancreas, adrenal glands, GI tract (gastrin, secretin, GIP, CCK-PZ) and gonads; mechanism of hormone action (through cAMP and steroid hormones only); effects of hypo secretion and hyper secretion of various hormones of the above mentioned glands. Note: Diseases related to all the human physiological systems to be taught in brief. Topics having numerical problems to be taught with illustrative examples.	

	of plasmodesmata), cell membrane (description of fluid mosaic model; functions of the plasma membrane: active and passive transport, brief explanation of facilitated diffusion (uniport, symport and antiport) with one example]. Mitochondria, nucleus (nuclear membrane, chromatin, nucleolus, structure and types of chromosomes on the basis of the position of centromere, satellite), types of plastids, endomembrane system (endoplasmic reticulum, Golgi complex, lysosomes and vacuoles), ribosomes, microbodies, cytoskeleton (microfilaments, microtubules and intermediate				

	filaments), cilia, flagella and centrioles; differences between prokaryotic cell and eukaryotic cell, plant cell and animal cell. **(ii) Biomolecules** Proteins, carbohydrates, lipids, enzymes, secondary metabolites. Carbohydrates: general classification and functions of: monosaccharides (glucose, ribose and deoxyribose), disaccharides (maltose, lactose and sucrose), polysaccharides (glycogen, starch, cellulose, inulin, and chitin). Proteins: amino acids – (structure: glycine, alanine, serine); amino acids as zwitter-ion; examples of acidic, basic, neutral, sulphur containing amino acids; essential and				

	non essential amino acids; levels of protein structure (primary, secondary, tertiary and quaternary); functions of proteins. Lipids: classification, structure and functions of fats and oils. Enzymes: general properties, nomenclature and classification o**f** enzymes according to type of reactions, co-factors (prosthetic groups, coenzymes and metal ions). Factors affecting enzyme activity - temperature, pH, substrate concentration. Competitive inhibitors. Definition and examples of secondary metabolites. **(iii) Cell Cycle and Cell Division** Cell cycle, mitosis, meiosis and their				

	significance. Definition of C-value, different stages of cell cycle (Go, G1, S and G2 and M). Different stages of mitosis and meiosis (prophase – I) with diagrams. Significance of mitosis and meiosis. Differences between mitosis and meiosis				
Computer Science With Java & Python (DHANPAT RAI & Co.)					
Chapter-1. Data Representation (System of Numeration): Representation of numbers in different bases and interconversion between them (e.g. binary, octal, decimal, hexadecimal). Addition, subtraction and multiplication operations for	**Chapter-3. GENERAL OOP CONCEPTS:** Introduction, Evolution of Software, Basic Concepts of OOP. **Chapter-4. INTRODUCING JAVA:** Introduction, About Java, Simple Java Program, Creating and Running a Java Program.	Prepare 5 Java Programs on the basis of Half Yearly Syllabus.	**Chapter-9. PROGRAM ERROR TYPES AND BASIC EXCEPTION HANDLING:** Type of program errors, Exception and Exception Handling, Exception Hierarchy, Forcing an Exception, Benefits of Exception Handling. **Chapter-10. SIMPLE INPUT/OUTPUT, WRAPPER CLASSES AND PACKAGES:**	**Chapter-1. Data Representation (System of Numeration) :** Representation of numbers in different bases and interconversion between them (e.g. binary, octal, decimal, hexadecimal). Addition, subtraction and multiplication operations for numbers in different bases. Introduce the positional system of representing numbers and the concept of a base. Discuss the conversion of	Prepare 5 Java Programs and 5 Python Programs on the basis of Annual Syllabus. Prepare a PPT with at least 10-slides on the topic of **Ch-16 (Trends in Computing and Ethical Issues).**

numbers in different bases. Introduce the positional system of representing numbers and the concept of a base. Discuss the conversion of representations between different bases using English or pseudo code. These algorithms are also good examples for defining different functions in a class modelling numbers (when programming is discussed). For addition and subtraction (1's complement and 2's complement) use the analogy with decimal numbers, emphasize how carry works (this will be useful later when binary adders are discussed),	**Chapter-5. JAVA FUNDAMENTALS:** Introduction, Java Character Set, Tokens, Concept of Data Types, Variables, Concepts, Operators in Java, Expressions, Java Statements, Significant of Classes, Object as Instances of Class. **Chapter-6. FLOW OF CONTROL:** Introduction, Programming Constructs, Selection Statements, Iteration Statements (for, while, do-while), Nested Loop, Comparison of Loops, Jump Statements. **Chapter-7. CLASSES IN JAVA:** Introduction, Class as Composite Type,		Simple Input/Output, Wrapper Classes, Packages in Java. **Chapter-11. ARRAYS AND STRINGS:** Need for Arrays, Types of Arrays, Searching, Sorting, Arrays Vs Objects, Advantages and Disadvantages of Arrays, Working with String.	representations between different bases using English or pseudo code. These algorithms are also good examples for defining different functions in a class modelling numbers (when programming is discussed). For addition and subtraction (1's complement and 2's complement) use the analogy with decimal numbers, emphasize how carry works (this will be useful later when binary adders are discussed), multiplication of numbers in different bases [without decimals]. **Encodings** Characters and their encodings (e.g. ASCII, ISCII, Unicode). Discuss the limitations of the ASCII code in representing characters of other languages. Discuss the Unicode representation for the local language. Java uses Unicode, so strings in	

multiplication of numbers in different bases [without decimals]. **Encodings** Characters and their encodings (e.g. ASCII, ISCII, Unicode). Discuss the limitations of the ASCII code in representing characters of other languages. Discuss the Unicode representation for the local language. Java uses Unicode, so strings in the local language can be used (they can be displayed if fonts are available) – a simple table lookup for local language equivalents for Latin (i.e. English) character strings may be done.	Creating and Using Objects, Encapsulation, Visibility Modifiers, Scope and Visibility Rules. **Chapter-8. FUNCTION/METHODS AND CONSTRUCTORS:** Methods and Constructors (as abstractions for complex user defined operations on objects), methods as mechanisms for side effects; formal arguments and actual arguments in methods; different behaviour of primitive arguments. Static methods and variables. The **this** operator. Examples of algorithmic problem solving using methods (number problems, finding			the local language can be used (they can be displayed if fonts are available) – a simple table lookup for local language equivalents for Latin (i.e. English) character strings may be done. **<u>Chapter -2. Propositional logic and Hardware:</u>** (a) Propositional logic, well-formed formulae, truth values and interpretation of well formed formulae, truth tables. Propositional variables; the common logical connectives ~ (negation) ∧ (and)(conjunction),∨ (or)(disjunction), ⇒ (implication), ⇔ (equivalence)); definition of a well-formed formula (wff); representation of simple word problems as wff (this can be used for motivation); the values true and	

Chapter -2. Propositional logic and Hardware: (a) Propositional logic, well-formed formulae, truth values and interpretation of well formed formulae, truth tables. Propositional variables; the common logical connectives ~ (negation) ∧ (and)(conjunction), ∨ (or)(disjunction), ⇒ (implication), ⇔ (equivalence)); definition of a well-formed formula (wff); representation of simple word problems as wff (this can be used	roots of algebraic equations etc.).			false; interpretation of a wff; truth tables; satisfiable, unsatisfiable and valid formulae. (b) Logic and hardware, basic gates (AND, NOT, OR) and their universality, other gates (NAND, NOR, XOR, XNOR), half adder, full adder. **Chapter-5. JAVA FUNDAMENTALS:** Introduction, Java Character Set, Tokens, Concept of Data Types, Variables, Concepts, Operators in Java, Expressions, Java Statements, Significant of Classes, Object as Instances of Class. **Chapter-6. FLOW OF CONTROL:** Introduction, Programming Constructs, Selection Statements, Iteration Statements (for, while, do-	

for motivation); the values true and false; interpretation of a wff; truth tables; satisfiable, unsatisfiable and valid formulae. (b) Logic and hardware, basic gates (AND, NOT, OR) and their universality, other gates (NAND, NOR, XOR, XNOR), half adder, full adder.				while), Nested Loop, Comparison of Loops, Jump Statements. **Chapter-7. CLASSES IN JAVA:** Introduction, Class as Composite Type, Creating and Using Objects, Encapsulation, Visibility Modifiers, Scope and Visibility Rules. **Chapter-8. FUNCTION/METHODS AND CONSTRUCTORS:** Methods and Constructors (as abstractions for complex user defined operations on objects), methods as mechanisms for side effects; formal arguments and actual arguments in methods; different behaviour of primitive arguments. Static methods and variables. The **this** operator. Examples of algorithmic problem	

				solving using methods (number problems, finding roots of algebraic equations etc.). **Chapter-9. PROGRAM ERROR TYPES AND BASIC EXCEPTION HANDLING:** Type of program errors, Exception and Exception Handling, Exception Hierarchy, Forcing an Exception, Benefits of Exception Handling. **Chapter-10. SIMPLE INPUT/OUTPUT, WRAPPER CLASSES AND PACKAGES:** Simple Input/Output, Wrapper Classes, Packages in Java. **Chapter-11. ARRAYS AND STRINGS:** Need for Arrays, Types of Arrays, Searching, Sorting, Arrays Vs Objects, Advantages and Disadvantages of Arrays, Working with String. **Chapter-12. OPERATIONS ON FILES:**	

				Files, Java Streams, Operations on Files, Working with text files, Working with binary files, String Tokenizer, Stream Tokenizer, Obtaining Input Using Scanner Class, Printing in Java. **Chapter-13. GETTING STARTED WITH PYTHON:** Python –Pluses & Minus, Working in Python, Understanding First Program. **Chapter-14. PYTHON FUNDAMENTALS:** Python Character Set, Tokens, variable and assignment, simple input and output, Data types, mutable and immutable types, operators, expressions, type casting, error and debugging. **Chapter-15. FLOW OF CONTROL (PYTHON):** Types of statements of python, statement flow control, The if statements of python, Repetition of task,	

				The range() function, Iteration/looping statements.	

Accountancy (Double Entry & Book Keping, TS Grewal Sultan Chand Publication)					
1. Introduction to Accounting: (i) A brief history of Accounting. (ii) Basic Terms: Event, Transaction, Vouchers, Capital, Assets (intangible, tangible, fixed, current, liquid, wasting and fictitious), Liabilities (internal and external – current, long-term and contingent), Trade Debtors, Trade Creditors, Purchases, Sales, Goods traded in, Stock (raw material, work in progress and finished goods), Profit, Gain, Loss, Expense, Revenue,	**1. Journal** (i) Accounting equation: Meaning and usefulness, simple practical problems. (ii) Journal: recording of entries in journal with narration. (a) Classification of Accounts: traditional classification or modern approach. (b) Double Entry System. (c) Rules of journalizing : traditional classification or modern approach. (d) Meaning of journal; Advantages of using a journal.	1. Develop a case study of a sole trader starting business with a certain amount of capital. The trader could have got the amount from his past savings or by borrowing from a bank by mortgaging his personal assets or by winning a lottery or any other source. • Write in detail, his transactions during the year- his purchases - cash and credit, sales- cash and credit, expenses, purchase of fixed assets and depreciation charged on them, any outstanding expenses, prepaid expenses, accrued income, drawing bills of exchange, accepting bills payable, etc. • From this case study developed (which should have at least 15	1. Accounting Concepts GAAP (Generally Accepted Accounting Principles), Basis of Accounting; Accounting Standards; IFRS (International Financial Reporting Standards). 2. Depreciation 3. Bills of Exchange	**1. Introduction to Accounting** i. Brief history of Accounting ii. Basic Terms iii. Stakeholders of accounting information **2. Accounting Concepts** i. GAAP ii.Basis of accounting 3.Journal, Ledger and Trial Balance (i) Accounting equation (ii) Journal (iii) Ledger (iv) Trial Balance **4. Depreciation** (i) Meaning (ii) Methods of charging depreciation 5. Final Accounts and Concept of Trading, Profit and Loss account and Balance Sheet (with and	1. Draw a specimen of bill of exchange to show how they differ from Promissory note and develop a question based on two bills of exchange, one of them being honoured and the other dishonoured and its renewal along with noting charges and interest. 2. Develop a case study by creating an imaginary Trial Balance and develop any five-six adjustments and then prepare the Trading, Profit & loss account and Balance Sheet out of it, along with journal entries for those adjustments .

Income and Drawings. (iii) Meaning and definition of Book-keeping, Accounting and Accountancy; difference between book-keeping, accounting and accountancy; accounting cycle. (iv) Stakeholders of accounting information. **2. Accounting Concepts** GAAP (Generally Accepted Accounting Principles), Basis of Accounting; Accounting Standards; IFRS (International Financial Reporting Standards).	(e) Format of journal. (f) Simple and compound journal entries. (g) Opening Journal entry. (h) Brief theoretical introduction to GST. **(2) Ledger:** (a) Meaning of ledger. (b) Format of a ledger. (c) Mechanics of posting. (d) Closing / Balancing of ledger accounts (e) Adjusting and closing journal entries.	transactions), pass the journal entries, post them into the ledger, prepare a Trial Balance and the Trading and Profit and Loss Account and Balance Sheet. 2. Take any five accounting concepts and give any two practical examples of each to bring out clearly the understanding of the concept.		without adjustments), Marshalling of Balance Sheet	

(i) GAAP: Going Concern, Accounting Entity, Money Measurement, Accounting Period, Complete Disclosure, Revenue Recognition, Verifiable Objective, Matching Principle, Historical Cost, Accrual Concept, Dual Aspect Concept, Materiality, Consistency, Prudence and Timeliness, Industry Practice, Substance over legal form. (ii) Basis of accounting: cash basis and accrual basis (meaning; difference). (iii) Accounting Standards: Meaning; Utility/ Advantages.	**(3) Sub-division of journal** (a) Cash book [including simple cash book and triple column cash book (cash, bank and discount) with contra entry pertaining to receipt of cheque not deposited on the same day; adjustments pertaining to a definite cash balance to be maintained / overdraft facility to be availed at the end of the period]. (b) Petty cash book (c) Sales day book, purchases day book (d) Sales return day book, purchases return day book- Simple (e) Journal proper.				

(iv) IFRS (International Financial Reporting Standards) – Brief introduction	(f) Mechanics of posting from special subsidiary books. **(4) Trial Balance** (a) Meaning, objectives, advantages and limitations of a Trial Balance. (b) Preparation of the Trial Balance by the balance method from the given ledger account balances				
Economics (Frank ISC Economics)					
Understanding Economics **(i) Definition of Economics:** Adam Smith, Alfred Marshall, Lionel Robbins, Samuelson **(ii) Micro and Macro Economics –** Meaning and	**Including UT 1** **(i) Basic problems of an economy:** what to produce; how to produce; for whom to produce; efficient use of resources **(ii) Types of economies:** developed and developing;	Write a detailed comparative study about micro and macro economics. Study in detail the South Asian Association for Regional Cooperation (SAARC) and its impact on Indian economy.	**(1) Micro and Macro Economics** – Meaning and Difference **(2) Types of economies:** Developed and developing; Economic systems: capitalism, socialism and mixed economy; mechanism used to solve the basic	**1. Understanding Economics** **(i) Definition of Economics:** Adam Smith, Alfred Marshall, Lionel Robbins, Samuelson **(ii) Micro and Macro** Economics – Meaning and Difference. Basic concepts: utility, price, value, wealth, welfare, money, market,	1. Prepare a report on the various poverty alleviation and employment generation programmes started in India, with special focus on MNREGA. 2. Provide the real life cases wherein the measures of statistics could be used.

Difference. Basic concepts: utility, price, value, wealth, welfare, money, market, capital, investment, income, production, consumption, saving, Business cycle, Aggregate demand and Aggregate supply	Economic systems: capitalism, socialism and mixed economy; mechanism used to solve the basic problems faced by each economy. Indian Economic Development (i) Introduction (ii) Parameters of Development. (iii) Planning and Economic Development in India. (iv) Structural Changes in the Indian Economy after liberalization. (v)Current challenges facing the Indian Economy. (vi) Economic Growth and Development. Economic Growth and Development . (vii) Sustainable Development.		problems faced by each economy **3. Indian Economic Development** (i) Introduction. Indian economy post liberalization: Main features, problems and policies of agriculture, industry and foreign trade. (ii) Parameters of Development. Parameters of development: per capita income (definition and limitations); meaning and construction of Human Development Index (HDI). India and HDI as per the UNDP report. (iii) Planning and Economic Development in India. Planning and economic development in India: a brief explanation. Major objectives of all	capital, investment, income, production, consumption, saving, Business cycle, Aggregate demand and Aggregate supply. (iii) Basic problems of an economy: what to produce; how to produce; for whom to produce; efficient use of resources (iv) Types of economies: developed and developing; Economic systems: capitalism, socialism and mixed economy; mechanism used to solve the basic problems faced by each economy. **2. Indian Economic Development** (i) Introduction (ii) Parameters of Development. (iii) Planning and Economic Development in India. (iv) Structural Changes in the Indian Economy after liberalization.	

	Effect of Economic Development on Resources and Environment.		the Five- Year Plans. NITI Aayog: objectives and role.	(v)Current challenges facing the Indian Economy. (vi) Economic Growth and Development. Economic Growth and Development (vii) Sustainable Development. Effect of Economic Development on Resources and Environment. **3. Statistics** (i) Statistics: definition, scope and limitations of statistics. Statistics: definition, scope and limitations of statistics. Special emphasis to be laid on importance of statistics in economics. (ii) Collection, organization and presentation of data. Collection of data - Sources of data: primary, secondary. Methods of collecting data: Some important sources of collecting secondary data; ways of collecting primary	

				data; organization of data: meaning and types of variables, frequency; presentation of data: tabular and diagrammatic presentation (bar diagram, pie, line, histogram, polygon and ogive curve). (iii) Measures of Central Value: average defined; type of averages: arithmetic mean; simple and weighted; median and mode; ungrouped and grouped data; numericals, relationship between mean, median and mode. Measures of Central Value: average defined; type of averages: arithmetic mean; simple and weighted; median and mode; ungrouped and grouped data. Numericals only on mean, median and mode for both ungrouped and grouped data. Relationship between mean, median and mode – the nature of the frequency distribution – symmetrical, positively	

				skewed and negatively skewed. (iv) Measures of dispersion: definition, methods of studying variation - range; standard deviation; quartile deviation; the mean or average deviation; coefficient of variation. Numericals on measures of dispersion required. (v) Correlation: introduction, scatter diagram; Karl Pearson's coefficient of correlation; Spearman's coefficient of correlation. Meaning and significance of correlation to be explained along with types and degrees. Scatter diagram, Karl Pearson's method (two variables, ungrouped data); Spearman's Rank Correlation to be explained with the help of numericals. (vi) Index numbers: simple and weighted - meaning, types and purpose. Problems involved in	

				constructing a Price Index Number. What does an Index number show, measure or indicate (like a Price Index Number). Difference between simple and weighted – Price weighted or quantity weighted. Laspayre's, Paasche and Fisher's methods of index numbers (to be explained with the help of numericals). Wholesale Price Index, Consumer Price Index and Index of Industrial Production should be explained. Uses of Index Numbers. Problems involved in constructing Price Index Number – the choice of the base year, the number of commodities to be included (coverage), choice of prices and the method to be used.	
Commerce (S. Chand's ISC Commerce)					
1. Business: Purpose and Classification	**Including UT 1**	Assume you are starting a partnership firm with your friend/friends. Develop a business plan	**(i) e-Business** Scope and benefits, Resources required	**1. Business: Purpose and Classification**	1. Contact an insurance agent and collect information about 5 different types of life

Meaning and features of business; Objectives of business; Classification of business activities; Business Ethics and Corporate Social Responsibility (i) Meaning and features of business (ii) Business objectives: Economic and social; Role of Profit in business. (iii)Classification of business activities: (a) Industry– types of industries on the basis of activity (primary secondary and tertiary) (b) Commerce– its nature and functions; importance of Commerce, trade	**Forms and Types of Business** Organisations (i) Forms of business organisations Private sector, public sector, Public Private Partnership (PPPs) /Joint Sector (Meaning and ,features) Comparative study between different forms of business organisations. (ii) Types of Business Organisations under the Private Sector: Sole Proprietorship Meaning, features, merits and demerits. (iii) Partnership Meaning, features, merits and demerits, registration, types of partners and types of partnership firms	covering the following aspects: a)Formation of this partnership firm – rules and steps that would be followed including the partnership deed. b) Choice of types of partners involved and your justification for the same.	for successful e-business implementation, online transactions, payment mechanisms. Emerging technology in e-business– Meaning of blockchain, its application in supply chain management. Security and safety of business transactions. **(ii) e-Commerce** Meaning of e-Commerce Q- Commerce (Quick Commerce) and artificial intelligence - concept of quick commerce and the integration of artificial intelligence, chatbots with customised consumer experience. **(iii) e-Banking** Online services – Transfer of funds	Meaning and features of business; Objectives of business; Classification of business activities; Business Ethics and Corporate Social Responsibility (i) Meaning and features of business (ii) Business objectives: Economic and social; Role of Profit in business. (iii)Classification of business activities: (a) Industry– types of industries on the basis of activity (primary secondary and tertiary) (b) Commerce– its nature and functions; importance of Commerce, trade (domestic and international) and aids to trade. Brief understanding of the above. **2. Forms and Types of Business Organisations**	insurance policies provided by different companies. Include information as per details given below for every insurance plan and make a comparative analysis. a)Premium of insurance b) Terms of inclusions and exclusions of each policy 2. Write and analyse the Corporate Social Responsibility activities of a pharmaceutical company and a five star hotel and also Comment on the changing role assumed by Corporates towards business ethics and social responsibility in the last decade.

(domestic and international) and aids to trade. Brief understanding of the above. (iv) Business Ethics and Corporate Social Responsibility.	**(iv) Corporate Organisations** (a) Joint Stock Company – Meaning, features, merits and demerits. (b) Types of companies – Public and private companies: Meaning and their comparative studies. (c) Stages of formation of a company. (d) Promotion - meaning, role and types of promoters. (e) Incorporation of a company – Meaning and steps of incorporation and certificate of incorporation. (f) Memorandum of Association and Articles of Association (excluding		through Real Time Gross Settlement (RTGS), National Electronic Funds Transfer (NEFT), Immediate Payment Service (IMPS), Digital Banking, UPI, E-wallet, Digital Rupee- Meaning only. Online payments, e-Banking – Meaning and features, advantages and disadvantages. Mobile Banking – SMS alerts, transfer of funds, making payments - advantages and disadvantages. Debit Cards vs Credit Cards, ATM (Automated Teller Machine) – Meaning; Debit card and credit card: features and differences.	(i) Forms of business organisations Private sector, public sector, Public Private Partnership (PPPs) /Joint Sector (Meaning and ,features) Comparative study between different forms of business organisations. (ii) Types of Business Organisations under the Private Sector: Sole Proprietorship Meaning, features, merits and demerits. (iii) Partnership Meaning, features, merits and demerits, registration, types of partners and types of partnership firms (iv) Corporate Organisations (a) Joint Stock Company – Meaning, features, merits and demerits. (b) Types of companies – Public and private	

	alterations) and distinction between the two documents. Meaning and contents of MOA and AOA. Distinction between the MOA and AOA. (g) Commencement of business. Steps, Certificate of Commencement. (h) Prospectus and statement in lieu of prospectus (i) Global enterprises – Meaning, characteristics, different types of global enterprises-meaning only. (vi) Co-operative organisations Meaning, features, merits and demerits		Demand draft– Meaning and Online issue of demand draft.	companies: Meaning and their comparative studies. (c) Stages of formation of a company. (d) Promotion - meaning, role and types of promoters. (e) Incorporation of a company – Meaning and steps of incorporation and certificate of incorporation. (f) Memorandum of Association and Articles of Association (excluding alterations) and distinction between the two documents. Meaning and contents of MOA and AOA. Distinction between the MOA and AOA. (g) Commencement of business. Steps, Certificate of Commencement. (h) Prospectus and statement in lieu of prospectus	

	Multistate Cooperative Society.			(i) Global enterprises – Meaning, characteristics, different types of global enterprises-meaning only. (vi) Co-operative organisations Meaning, features, merits and demerits Multistate Cooperative Society. (iv) Business Ethics and Corporate Social Responsibility. **3. Contemporary and Evolving Modes of Business** (i) e-Business Scope and benefits, Resources required for successful e-business implementation, online transactions, payment mechanisms. Emerging technology in e-business– Meaning of blockchain, its application in supply chain management.	

				Security and safety of business transactions. (ii) e-Commerce Meaning of e-Commerce Q- Commerce (Quick Commerce) and artificial intelligence - concept of quick commerce and the integration of artificial intelligence, chatbots with customised consumer experience. (iii) e-Banking Online services – Transfer of funds through Real Time Gross Settlement (RTGS), National Electronic Funds Transfer (NEFT), Immediate Payment Service (IMPS), Digital Banking, UPI, E-wallet, Digital Rupee-Meaning only. Online payments, e-Banking – Meaning and features, advantages and disadvantages. Mobile Banking – SMS alerts, transfer of f funds, making payments -	

				advantages and disadvantages. Debit Cards vs Credit Cards, ATM (Automated Teller Machine) – Meaning; Debit card and credit card: features and differences. Demand draft– Meaning and Online issue of demand draft. **4. Domestic Trade** (i) Wholesale trade Meaning and features of wholesale trade and services of wholesaler to retailer, customer and producer. (ii) Retail trade Retail trade – meaning and features of retail trade. Distinction between wholesale and retail trade. Types of retail trade – Itinerant and small-scale fixed shops: departmental	

				stores, chain stores and dark stores. Concept of digital retailing. Omnichannel retailing. Meaning and features only. **5. Business Risks and Insurance** **(i) Risks in business –** insurable and non-insurable (meaning and features only). **(ii) Insurance** Meaning and features of insurance. **(iii) Principles of insurance**. Fundamental principles to be explained: utmost good faith; insurable interest; indemnity; contribution; doctrine of subrogation; causa proxima. Mitigation of loss. (iv) Concept of re-insurance and double insurance.	

				(v) Concept of assurance; Comparison between assurance and insurance **(vi) Types of insurance:** Types of insurance – life, health, fire, marine, motor, social and fidelity insurance	
Value Education (Life Values by Jaycee publications)					
	Chapter 1- Stop cruelty to Animals Chapter 2- Self-respect adds to Self-worth Chapter 3- Be a virtuous Person Chapter 4- Make Realistic Desires Chapter 5- Conquer Ego; Embrace Humility Chapter 6- Building Relationships Chapter 7- Sanctity of Sex Chapter 8- Be persistent **Prayer-** Prayer for Wisdom and Right Choices			Chapter 9- Pessimism is Weakness; Optimism is Power Chapter 10- Effective Communication Skills Chapter 11- Media: A Strong Influencer Chapter 12- Internet: A Boon or A Curse Chapter 13- Career is a Crucial Choice Chapter 14- Humaneness, The Greatest of All Virtues Chapter 15- Admitting Faults Chapter 16- To Err is Human; To Forgive is Divine **Prayer:** Prayer for Peace and Harmony	

SUPW					
	Productive Work A. Skill-Based Craft Work Making Birthday Card Book Binding Stitching: To attach a button Cooking without fire B. Environment Focus Growing Medical Plants (Tree plantation Drive in School) c. Education Service Teach basic reading/writing to helpers or juniors	Community Service Cleaning home and school Helping parents daily (20–30 min) CONTEMPORARY STUDIES (OPTIONAL) Poster making on Social Equality		Productive Work A. Skill-Based Craft Work Knitting & Embroidery work Construction of Decorative pieces Dyeing & Printing Stage Craft B. Social Awareness National Day Celebration (Skits, speeches, exhibitions) C. Savings Awareness Teach benefits of saving money/ Use of Bank & Post office to Helpers or Juniors	Community Service Visiting sick people Helping in plantation CONTEMPORARY STUDIES (OPTIONAL) Poster making on Energy Conservation
Physical Education (Saraswati ISC Physical Education)					
Section-1 **Chapter – 1** 1. Concept of Physical Education	1. Concepts Of Physical Education 2. Individual Aspects and Group Dynamics 3. Effects of Physical Exercise on Human Body Systems		1. Nutrition, weight Control and exercise 2. Physical fitness and wellness	1. Concept of Physical Education 2. Individual Aspects and Group Dynamics 3. Effects Of Physical Exercise on Human Body systems 4. Nutrition Weight Control and Exercise	1. Physical efficiency test 2. Specialization Game 3. explain the Yoga 4. Explain The Elements Of Yoga

				5. Physical Fitness and wellness 6. Games and Sport- A Global Perspective	