

**Board of Intermediate Education, Andhra Pradesh.**

**Intermediate – I Year Syllabus w.e.f. 2012 – 13**

**Subject : MATHEMATICS – IA**

<b>S. No.</b>	<b>Topics</b>	<b>Page No.</b>
1	<b><u>Functions :</u></b> Types of functions – Definitions. Inverse functions and Theorems. Domain, Range, Inverse of real valued functions.	
2	<b><u>Mathematical Induction</u></b> Principle of Mathematical Induction & Theorems. Applications of Mathematical Induction. Problems on divisibility.	
3	<b><u>Matrices:</u></b> Types of matrices Scalar multiple of a matrix and multiplication of matrices Transpose of a matrix Determinants Adjoint and Inverse of a matrix Consistency and inconsistency of Equations- Rank of a matrix Solution of simultaneous linear equations	
4	<b><u>VECTOR ALGEBRA</u></b> <b><u>Addition of Vectors :</u></b> Vectors as a triad of real numbers. Classification of vectors. Addition of vectors. Scalar multiplication. Angle between two non zero vectors. Linear combination of vectors. Component of a vector in three dimensions. Vector equations of line and plane including their Cartesian equivalent forms.	
5	<b><u>Product of Vectors :</u></b> Scalar Product - Geometrical Interpretations - orthogonal projections. Properties of dot product. Expression of dot product in i, j, k system - Angle between two vectors. Geometrical Vector methods. Vector equations of plane in normal form. Angle between two planes. Vector product of two vectors and properties. Vector product in i, j, k system. Vector Areas. Scalar Triple Product.	

	Vector equations of plane in different forms, skew lines, shortest distance and their Cartesian equivalents. Plane through the line of intersection of two planes, condition for coplanarity of two lines, perpendicular distance of a point from a plane, Angle between line and a plane. Cartesian equivalents of all these results Vector Triple Product – Results	
6	<b>TRIGONOMETRY</b> <b>Trigonometric Ratios up to Transformations :</b> Graphs and Periodicity of Trigonometric functions. Trigonometric ratios and Compound angles. Trigonometric ratios of multiple and sub- multiple angles. Transformations - Sum and Product rules.	
7	<b>Trigonometric Equations:</b> General Solution of Trigonometric Equations. Simple Trigonometric Equations – Solutions.	
8	<b>Inverse Trigonometric Functions:</b> To reduce a Trigonometric Function into a bijection. Graphs of Inverse Trigonometric Functions. Properties of Inverse Trigonometric Functions.	
9	<b>8 Hyperbolic Functions:</b> Definition of Hyperbolic Function – Graphs. Definition of Inverse Hyperbolic Functions – Graphs. Addition formulas of Hyperbolic Functions.	
10	<b>Properties of Triangles:</b> Relation between sides and angles of a Triangle Sine, Cosine, Tangent and Projection rules. Half angle formulae and areas of a triangle In-circle and Ex-circle of a Triangle.	

**Topics deleted under  
30% reduction of Syllabus due to COVID-19**

1	Functions 1.2-> Inverse Functions and theorems	14 – 22
2	Mathematical Induction	
3	Matrices –	85 – 89
	3.4.8-> Properties of determinants	89
	3.4.9-> Notations	89 – 94
	3.4.10-> Solved problems	95 – 96
	Exercise.3(d) Problems II and III	98 – 99
	Proof of $A^{-1} = \frac{\text{adj}A}{ A }$ and 3.5.5 theorem	109 – 115
	3.6.8 to 3.6.13 (Consistent and in consistent system) including exercise 3g	118 – 124
	3.7.4 to 3.7.9 Gauss Jordan Method and related problems solution of a homogenous linear Equations	
5	Product of Vectors	196 – 215

	5.10 to 5.13 : Scalar Triple product and onwards including exercise 5(c)	
7	Trigonometric Equations – Full	
8	Inverse Trigonometric functions – Full	
10	Properties of Triangles Problems related to Heights and distances and solved problems 27 and 28 Problems 13 to 18 in III exercise 10(a)	389 392

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**Subject : MATHEMATICS – IB**

S. No.	Topics	Page No.
	<b><u>COORDINATE GEOMETRY</u></b>	
1.	<b><u>Locus :</u></b> Definition of locus – Illustrations. To find equations of locus - Problems connected to it.	
2.	<b><u>Transformation of Axes :</u></b> Transformation of axes - Rules, Derivations and Illustrations. Rotation of axes - Derivations – Illustrations.	
3.	<b><u>The Straight Line :</u></b> Revision of fundamental results. Straight line - Normal form – Illustrations. Straight line - Symmetric form. Straight line - Reduction into various forms. Intersection of two Straight Lines. Family of straight lines - Concurrent lines. Condition for Concurrent lines. Angle between two lines. Length of perpendicular from a point to a Line. Distance between two parallel lines. Concurrent lines - properties related to a triangle.	
4.	<b><u>Pair of Straight lines:</u></b> Equations of pair of lines passing through origin, angle between a pair of lines. Condition for perpendicular and coincident lines, bisectors of angles. Pair of bisectors of angles. Pair of lines - second degree general equation. Conditions for parallel lines - distance between them, Point of intersection of pair of lines. Homogenizing a second degree equation with a first degree equation in X and Y.	
5	<b><u>Three Dimensional Coordinates :</u></b> Coordinates. Section formulas - Centroid of a triangle and tetrahedron.	
6.	<b><u>Direction Cosines and Direction Ratios :</u></b> Direction Cosines. Direction Ratios	
7.	<b><u>Plane :</u></b> Cartesian equation of Plane - Simple Illustrations.	
8.	<b><u>CALCULUS</u></b> <b><u>Limits and Continuity:</u></b> Intervals and neighborhoods.	

	Limits. Standard Limits. Continuity.		
9.	<b>Differentiation :</b> Derivative of a function. Elementary Properties. Trigonometric, Inverse Trigonometric, Hyperbolic, Inverse Hyperbolic Function - Derivatives. Methods of Differentiation. Second Order Derivatives		
10.	<b>Applications of Derivatives:</b> Errors and approximations. Geometrical Interpretation of a derivative. Equations of tangents and normals. Lengths of tangent, normal, sub tangent and sub normal. Angles between two curves and condition for orthogonality of curves. Derivative as Rate of change. Rolle's Theorem and Lagrange's Mean value theorem without proofs and their geometrical interpretation. Increasing and decreasing functions. Maxima and Minima.		
<b>Topics deleted under 30% reduction of Syllabus due to COVID-19</b>			
2.	<b>Transformation of AXES</b>	Full	
4.	<b>Pair of Straight Lines</b>	Proofs of all Theorems and 4.3.4 including exercise 4(a)	91 – 97
6.	<b>D.Cs and D.Rs</b>	6.2.6 to 6.2.11 Angle between two lines and problems related to it	140 – 149
7.	<b>Plane</b>	7.1.12- Angle between two planes and problems related to it	159
10.	<b>Applications of Derivatives</b>	10.1 to 10.1.5 including exercise 10(a) ` Errors and approximations	255 – 261
		10.4 – Lengths of tangent, Sub tangent, Normal and subnormal including ex-10(c)	271 – 274
		– Derivate as a rate of change including ex-10(e) – Rolle's and Legrange's Mean value theorems	278 – 290

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**Intermediate – II Year Syllabus w.e.f. 2013 – 14**

**Subject : MATHEMATICS – IIA**

S. No.	Topics	Page No.
1.	<p><b>ALGEBRA</b>  <b>Complex Numbers:</b>                      Complex number as an ordered pair of real numbers-                      fundamental operations                      Representation of complex numbers in the form <math>a+ib</math>.                      Modulus and amplitude of complex numbers                      Illustrations.                      Geometrical and Polar Representation of complex                      numbers in Argand plane- Argand diagram.</p>	
2.	<p><b>De Moivre's Theorem:</b>                      De Moivre's theorem- Integral and Rational indices.  <math>n^{\text{th}}</math> roots of unity- Geometrical Interpretations –                      Illustrations.</p>	
3.	<p><b>Quadratic Expressions:</b>                      Quadratic expressions, equations in one variable                      Sign of quadratic expressions – Change in signs – Maximum and                      minimum values                      Quadratic in equations</p>	
4.	<p><b>Theory of Equations:</b>                      The relation between the roots and coefficients in an equation                      Solving the equations when two or more roots of it are connected                      by certain relation                      Equation with real coefficients, occurrence of complex roots in                      conjugate pairs and its Consequences                      Transformation of equations – Reciprocal Equations.</p>	
5.	<p><b>Permutations and Combinations:</b>                      Fundamental Principle of counting - linear and circular                      permutations                      Permutations of 'n' dissimilar things taken 'r' at a time.                      Permutations when repetitions allowed                      Circular permutations                      Permutations with constraint repetitions.                      Combinations-definitions and certain theorems</p>	
6.	<p><b>Binomial Theorem:</b>                      Binomial theorem for positive integral index                      Binomial theorem for rational Index (without proof).                      Approximations using Binomial theorem</p>	
7.	<p><b>Partial fractions:</b>                      Partial fractions of <math>f(x)/g(x)</math> when <math>g(x)</math> contains non –                      repeated linear factors.                      Partial fractions of <math>f(x)/g(x)</math> when <math>g(x)</math> contains repeated                      and/or non-repeated linear factors.                      Partial fractions of <math>f(x)/g(x)</math> when <math>g(x)</math> contains</p>	

	irreducible factors.		
8.	<b>PROBABILITY</b> <b>MEASURES OF DISPERSION</b> <b>Range</b> Mean deviation Variance and standard deviation of ungrouped/grouped data. Coefficient of variation and analysis of frequency distribution with equal means but different variances.		
9.	<b>Probability</b> Random experiments and events Classical definition of probability, Axiomatic approach and addition theorem of probability. 9.3 Independent and dependent events conditional probability- multiplication theorem and Bayee's theorem.		
10.	<b>Random Variables and Probability Distributions:</b> Random Variables Theoretical discrete distributions – Binomial and Poisson Distributions		
<b>Topics deleted under 30% reduction of Syllabus due to COVID-19</b>			
1.	Complex Numbers	1.2.8-> Square root of a Complex Number and related problems in solved problems and exercise 1(b)	
3.	Quadratic Expressions	3.3-> Quadratic inequations including exercise 3(c)	85 - 90
4.	Theory of Equations	4.4-> Transformation of Equations including exercise 4(d)	129 - 144
5.	Permutations & Combinations	Derivation of formula npr and ncr Theorems :5.2.1 and 5.6.1	154, 183
6.	Bi-nominal theorem	Full	
7.	Partial Functions	7.3.8 and including exercise 7(d)	274 - 275
8.	Measures of Dispersion	8.4-> Coefficient of variation and analysis of frequency distributions with equal means Solved problems 2,3,6 in 8.5 and problem No:3 in III in exercise 8(a)	296 - 304

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**Subject : MATHEMATICS – IIB**

S. No.	Topics	Page No.
1.	<p><b>COORDINATE GEOMETRY</b></p> <p><b>Circle :</b></p> <p>Equation of circle -standard form-centre and radius of a circle with a given line segment as diameter &amp; equation of circle through three non collinear points - parametric equations of a circle.</p> <p>Position of a point in the plane of a circle – power of a point-definition of tangent-length of tangent</p> <p>Position of a straight line in the plane of a circle-conditions for a line to be tangent – chord joining two points on a circle – equation of the tangent at a point on the circle- point of contact-equation of normal.</p> <p>Chord of contact - pole and polar-conjugate points and conjugate lines - equation of chord with given middle point.</p> <p>Relative position of two circles- circles touching each other externally, internally common tangents –centers of similitude- equation of pair of tangents from an external point.</p>	
2.	<p><b>System of circles:</b></p> <p>Angle between two intersecting circles.</p> <p>Radical axis of two circles- properties- Common chord and common tangent of two circles – radical centre.</p> <p>Intersection of a line and a Circle.</p>	
3.	<p><b>Parabola:</b></p> <p>Conic sections –Parabola- equation of parabola in standard form-different forms of parabola- parametric equations.</p> <p>Equations of tangent and normal at a point on the parabola ( Cartesian and parametric) - conditions for straight line to be a tangent.</p>	
4.	<p><b>Ellipse:</b></p> <p>4.1 Equation of ellipse in standard form- Parametric equations.</p>	



	4.2 Equation of tangent and normal at a point on the ellipse (Cartesian and parametric)- condition for a straight line to be a tangent.		
5	<b>Hyperbola:</b> Equation of hyperbola in standard form- Parametric equations. Equations of tangent and normal at a point on the hyperbola (Cartesian and parametric)- conditions for a straight line to be a tangent- Asymptotes.		
6.	<b>CALCULUS</b> <b>Integration :</b> Integration as the inverse process of differentiation- Standard forms – properties of integrals. Method of substitution- integration of Algebraic, exponential, logarithmic, trigonometric and inverse trigonometric functions. Integration by parts. Integration- Partial fractions method. Reduction formulae.		
7.	<b>Definite Integrals:</b> Definite Integral as the limit of sum Interpretation of Definite Integral as an area. Fundamental theorem of Integral Calculus. Properties. Reduction formulae. Application of Definite integral to areas.		
8.	<b>Differential equations:</b> Formation of differential equation-Degree and order of an ordinary differential equation. Solving differential equation by a) Variables separable method. b) Homogeneous differential equation. c) Non - Homogeneous differential equation. Linear differential equations.		
<b>Topics deleted under 30% reduction of Syllabus due to COVID-19</b>			
1.	Circles	1.5-> Relative positions of two circles including Ex 1(e) and solved problems	60 – 70
3.	Parabola	3.2-> Tangents & Normal including Ex 3(b)	117 -128
4.	Ellipse	4.2-> Equations of tangents & Normal including Ex 4(b)	148 – 158

6.	Integration	Evaluation of $\int (px + q) \sqrt{ax^2 + bx + c} dx$ , $\int \sqrt{ax^2 + bx + c} dx$ related problems	
7.	Definite Integrals	7.1 and 7.2 -> Definite integral as the limit of the sum and limit of the sum and related problems in exercise 7(a) and 7(b) and Examples 7.6-> Application of Definite integrals to areas including ex 7(d)	262 – 268 283 – 286 297 – 308
8.	Differential Equations	8.17-> Formation of Differential Equations and problems related to it 8.2(C): Non – Homogeneous Differential Equations including Ex 8(d) Solution of linear differential Equations of the type $dx+Px=Q$ , Where P and Q	317 341 – 345

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**Subject : BOTANY – I**

<b>S. No.</b>	<b>Topics</b>	<b>Page No.</b>
<b>UNIT-I</b>	<b>DIVERSITY IN THE LIVING WORLD</b>	
	<p><b>1. The living world</b> What is living? Diversity in the living world; Taxonomic categories and taxonomical aids.</p>	
	<p><b>2. Biological Classification</b> Five kingdom classification - Monera, Protista, Fungi, Plantae and Animalia, Three domains of life (six kingdom classification), Viruses, Viroids, Prions &amp; Lichens.</p>	
	<p><b>3. Science of plants - Botany</b> Origin, Development, Scope of Botany and Branches of Botany.</p>	
	<p><b>4. Plant Kingdom</b> Salient features, classification and alternation of generations of the plants of the following groups – Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.</p>	
<b>UNIT - II</b>	<p><b>STRUCTURAL ORGANISATION IN PLANTS- MORPHOLOGY</b> <b>5. Morphology of flowering Plants</b> <b>Vegetative :</b> Parts of a typical Angiospermic plant; Vegetative morphology and modifications- Root, Stem and Leaf- types; Venation, Phyllotaxy. <b>Reproductive:</b> Inflorescence – Racemose, Cymose and special types ( in brief). <b>Flower :</b> Parts of a flower and their detailed description; Aestivation, Placentation. <b>Fruits :</b> Types- True, False and parthenocarpic fruits.</p>	
<b>UNIT-III</b>	<p><b>REPRODUCTION IN PLANTS</b> <b>6. Modes of Reproduction</b> Asexual reproduction, binary fission, Sporulation, budding, fragmentation, vegetative propagation in plants, Sexual reproduction in brief, Overview of angiosperm life cycle.</p> <p><b>7. Sexual Reproduction in Flowering Plants</b> Stamen, microsporangium, pollen grain. Pistil, megasporangium (ovule) and embryo sac; Development of male and female gametophytes. Pollination – Types, agents , Out breeding devices and Pollen – Pistil interaction. Double Fertilization; Post fertilisation events: Development of endosperm and embryo; development of seed, Structure of Dicotyledonous and Monocotyledonous seeds, Significance of fruit and seed. Special modes – Apomixis, parthenocarpy, polyembryony.</p>	

<b>UNIT-IV</b>	<b>PLANT SYSTEMATICS</b>	
	<p><b>8. Taxonomy of angiosperms</b> Introduction. Types of Systems of classification (In brief). Semi- Technical description of a typical flowering plant Description of Families: Fabaceae, Solanaceae and Liliaceae.</p>	
<b>UNIT-V</b>	<b>CELL STRUCTURE AND FUNCTION</b>	
	<p><b>9. Cell – The Unit of Life</b> Cell- Cell theory and cell as the basic unit of life- overview of the cell. Prokaryotic cells, Ultra Structure of Plant cell (structure in detail and functions in brief), Cell membrane, Cell wall, Cell organelles: Endoplasmic reticulum, Mitochondria, Plastids, Ribosomes, Golgi bodies, Vacuoles, Lysosomes, Microbodies, Centrosome and Centriole, Cilia, Flagella, Cytoskeleton and Nucleus. Chromosomes: Number, structural organization; Nucleosome.</p>	
	<p><b>10. Biomolecules</b> Structure and function of Proteins, Carbohydrates, Lipids and Nucleic acids.</p>	
	<p><b>11. Cell cycle and Cell Division</b> Cell cycle, Mitosis, Meiosis - significance.</p>	
<b>UNIT-VI</b>	<b>INTERNAL ORGANISATION OF PLANTS</b>	
	<p><b>12. Histology and Anatomy of Flowering Plants</b> Tissues - Types, structure and functions: Meristematic; Permanent tissues - Simple and Complex tissues. Tissue systems - Types, structure and function: Epidermal, Ground and Vascular tissue systems. Anatomy of Dicotyledonous and Monocotyledonous plants - Root, Stem and Leaf. Secondary growth in Dicot stem and Dicot root.</p>	
<b>UNIT-VII</b>	<b>PLANT ECOLOGY</b>	
	<p><b>13. Ecological Adaptations, Succession and Ecological Services</b> Introduction. Plant communities and Ecological adaptations: Hydrophytes, Mesophytes and Xerophytes. Plant succession. Ecological services – Carbon fixation, Oxygen release and pollination (in brief).</p>	

## Topics deleted under 30% reduction of Syllabus due to COVID-19

**Subject : BOTANY - 1**

<b>UNIT NO.</b>	<b>CHAPTER NO.</b>	<b>LESSON</b>	<b>SUB CHAPTER NO.</b>	<b>DELETED TOPICS</b>
<b>I.</b>	<b>1.</b>	The Living World	<b>1.2</b> <b>1.4</b>	Diversity in the Living World (Taxonomies Systematic ) Taxonomical Aids
	<b>4.</b>	Plant Kingdom	<b>4.5</b>	Angiosperms
<b>II.</b>	<b>5</b>	Morphology of Flowering plants	<b>5.3</b> <b>5.6</b> <b>5.7</b>	Leaf Fruits Seeds
<b>III.</b>	<b>6</b>	Modes of Reproduction		91 to 108 pages
<b>IV.</b>	<b>8</b>	Taxonomy of Angiosperms	<b>8.3.1</b>	Fabaceae
<b>VI.</b>	<b>12</b>	Histology and Anatomy of Flowering Plants	<b>12.1</b> <b>12.2</b> <b>12.4</b>	The Tissues The Tissue Systems Secondary growth

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**Subject : BOTANY – II**

<b>S. No.</b>	<b>Topics</b>	<b>Page No.</b>
<b>1.</b>	<p><b>Transport in Plants</b>  <b>Means of Transport-</b> Diffusion, Facilitated Diffusion, Passive symports and antiports, Active Transport, Comparison of Different Transport Processes, <b>Plant-Water Relations-</b> Water Potential, Osmosis, Plasmolysis, Imbibition, <b>Long Distance Transport of Water-</b> Water Movement up a Plant, Root Pressure, Transpiration pull, <b>Transpiration-</b> Opening and Closing of Stomata, Transpiration and Photosynthesis, <b>Uptake and Transport of Mineral Nutrients-</b> Uptake of Mineral Ions, Translocation of Mineral Ions, <b>Phloem Transport: Flow from Source to Sink-</b>The Pressure Flow or Mass Flow Hypothesis</p>	
<b>2.</b>	<p><b>Mineral Nutrition</b>  <b>Methods to Study the Mineral Requirements of Plants, Essential Mineral Elements-</b>Criteria for Essentiality, Macronutrients, Micronutrients, Role of Macro- and Micro- nutrients, Deficiency Symptoms of Essential Elements, Toxicity of Micronutrients, <b>Mechanism of Absorption of Elements, Translocation of Solutes, Soil as Reservoir of Essential Elements, Metabolism of Nitrogen-</b>Nitrogen Cycle, Biological Nitrogen Fixation, Symbiotic nitrogen fixation, Nodule Formation</p>	
<b>3.</b>	<p><b>Enzymes</b>  Chemical Reactions, Enzymatic Conversions, Nature of Enzyme Action, Factors Affecting Enzyme Activity, Temperature and pH, Concentration of Substrate, Classification and Nomenclature of Enzymes, Co-factors</p>	
<b>4.</b>	<p><b>Photosynthesis in Higher Plants</b>  <b>Early Experiments, Site of Photosynthesis, Pigments Involved in Photosynthesis, Light Reaction, The Electron Transport-</b> Splitting of Water, Cyclic and Non- cyclic Photo-phosphorylation, Chemiosmotic Hypothesis, <b>Biosynthetic phase-</b> The Primary Acceptor of CO<sub>2</sub>, The Calvin Cycle, <b>The C<sub>4</sub> Pathway, Photorespiration, Factors affecting Photosynthesis</b></p>	
<b>5.</b>	<p><b>Respiration of Plants</b>  <b>Cellular respiration, Glycolysis, Fermentation, Aerobic Respiration-</b> Tricarboxylic Acid Cycle, Electron Transport System (ETS) and Oxidative Phosphorylation, The Respiratory Balance Sheet, <b>Amphibolic Pathway, Respiratory Quotient</b></p>	
<b>6.</b>	<p><b>Plant Growth and Development</b>  <b>Growth-</b> Plant Growth, Phases of Growth, Growth Rates, Conditions for Growth, <b>Differentiation, Dedifferentiation and Redifferentiation, Development, Plant Growth Regulators-</b> Physiological Effects of Plant Growth Regulators, Auxins, Gibberellins, Cytokinins, Ethylene, Abscisic acid, <b>Seed Dormancy, Photoperiodism, Vernalisation</b></p>	

UNIT II	<b>Microbiology</b>	
7.	<b>Bacteria</b> <b>Morphology of Bacteria, Bacterial cell structure-</b> Nutrition, <b>Reproduction-</b> Sexual Reproduction, Conjugation, Transformation, Transduction, <b>The importance of Bacteria to Humans</b>	
8.	<b>Viruses</b> <b>Discovery, Classification of Viruses, structure of Viruses, Multiplication of Bacteriophages-</b> The Lysogenic Cycle, <b>Viral diseases in Plants, Viral diseases in Humans</b>	
Unit-III	<b>Genetics</b>	
9.	<b>Principles of Inheritance and Variation</b> <b>Mendel's Experiments, Inheritance of one gene (Monohybrid Cross)-</b> Back cross and Test cross, Law of Dominance, Law of Segregation or Law of purity of gametes, <b>Deviations from Mendelian concept of dominance-</b> Incomplete Dominance, Co-dominance, Explanation of the concept of dominance, <b>Inheritance of two genes-</b> Law of Independent Assortment, <b>Chromosomal Theory of Inheritance, Linkage and Recombination, Mutations-</b> Significance of mutations.	
Unit-IV	Molecular Biology	
10.	<b>Molecular Basis of inheritance</b> <b>The DNA-</b> Structure of Polynucleotide Chain, Packaging of DNA Helix, <b>The Search for Genetic Material,</b> Transforming Principle, Biochemical Characterisation of Transforming Principle, The Genetic Material is DNA, Properties of Genetic Material (DNA versus RNA), <b>RNA World, Replication-</b> The Experimental Proof, The Machinery and the Enzymes, <b>Transcription-</b> Transcription Unit, Transcription Unit and the Gene, Types of RNA and the process of Transcription, <b>Genetic Code-</b> Mutations and Genetic Code, tRNA– the Adapter Molecule, <b>Translation, Regulation of Gene Expression-</b> The LAC operon.	
UNIT V	<b>Biotechnology</b>	
11.	<b>Principles and processes of Biotechnology</b> <b>Principles of Biotechnology-</b> Construction of the first artificial recombinant DNA molecule, <b>Tools of Recombinant DNA Technology-</b> Restriction Enzymes, Cloning Vectors, Competent Host (For Transformation with Recombinant DNA), <b>Processes of Recombinant DNA Technology-</b> Isolation of the Genetic Material (DNA), Cutting of DNA at Specific Locations, Separation and isolation of DNA fragments, Insertion of isolated gene into a suitable vector, Amplification of Gene of Interest using PCR, Insertion of Recombinant DNA into the Host, Cell/Organism, Selection of Transformed host cells, Obtaining the Foreign Gene Product, Downstream Processing	
12.	<b>Biotechnology and its applications</b> <b>Biotechnological Applications In Agriculture-</b> Bt Cotton, Pest Resistant Plants, <b>Other applications of Biotechnology</b> Insulin, Gene therapy, Molecular Diagnosis, ELISA, DNA fingerprinting, <b>Transgenic plants, Bio-safety and Ethical issues-</b> Biopiracy	
UNIT VI	<b>Plants, Microbes and Human welfare</b>	
13	<b>Strategies for enhancement in food production</b> <b>Plant Breeding-</b> What is Plant Breeding?, Wheat and Rice, Sugarcane, Millets, Plant Breeding for Disease Resistance, Methods of breeding for	

	disease resistance, Mutation, Plant Breeding for Developing Resistance to Insect Pests, Plant Breeding for Improved Food Quality, <b>Single Cell Protein (SCP), Tissue Culture</b>	
<b>14.</b>	<b>Microbes in Human Welfare</b> Microbes in Household Products, Microbes in Industrial Products- Fermented Beverages, Antibiotics, Chemicals, Enzymes and other Bioactive Molecules, Microbes in Sewage Treatment, Primary treatment, Secondary treatment or Biological treatment, Microbes in Production of Biogas, Microbes as Biocontrol Agents, Biological control of pests and diseases, Microbes as Biofertilisers, Challenges posed by Microbes	
<b>Topics deleted under 30% reduction of Syllabus due to COVID-19</b>		
<b>2</b>	<b>Mineral nutrition – Total chapter deleted</b>	29 – 46
<b>6</b>	<b>Plant growth &amp; development .</b> : Growth : Differentiation , De- differentiate and Re-differentiation 6.3: Development : Seed dormancy : Photo- periodism : Vernalisation	105 – 121
<b>13</b>	<b>Strategies for enhancement on food production</b> : Plant breeding for disease resistance : Plant breeding for developing resistance to insect pests 13.1.4: Plant breeding for improve feed Quality 13.2: Single cell Proteins (SCP)	247 249 250 250



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**Subject : ZOOLOGY – I**

<b>S. No.</b>	<b>Topics</b>	<b>Page No.</b>
<b>UNIT- I</b>	<p><b>ZOOLOGY – Diversity of Living World</b> What is life? Nature, Scope &amp; meaning of zoology Branches of Zoology Need for classification- Zoos as tools for the study of taxonomy Basic principles of Classification: Biological system of classification- (Phylogenetic classification only) Levels or Hierarchy of classification Nomenclature – Bi &amp; Trinominal Species concept Kingdom Animalia Biodiversity – Meaning and distribution (Genetic diversity, Species diversity, Ecosystem diversity(alpha,beta and gama), other attributes of biodiversity, role of biodiversity, threats to biodiversity, methods of conservation, IUCN Red data books, Conservation of wild life in India – Legislation, Preservation, Organisations, Threatened species.</p>	
<b>UNIT- II</b>	<p><b>STRUCTURAL ORGANIZATION IN ANIMALS</b> Levels of organization, Multicellularity: Diploblastic &amp; Triploblastic conditions. Asymmetry, Symmetry: Radial symmetry, and Bilateral symmetry (<b>Brief account giving one example for each type from the representative phyla</b>) Acoelomates, Pseudocoelomates and Eucoelomates :- Schizo &amp; Entero coelomates (<b>Brief account of formation of coelom</b>) Tissues: Epithelial, Connective, Muscular and Nervous tissues. (make it a little more elobarative)</p>	
<b>UNIT- III</b>	<p><b>ANIMAL DIVERSITY - I: INVERTEBRATE PHYLA</b> <b>General Characters – Strictly restrict to 8 salient features only</b> <b>Classification up to Classes with two or three examples – Brief account only</b> Porifera Cnidaria Ctenophora Platyhelminthes Nematoda</p>	

	<p>Annelida (Include Earthworm as a type study strictly adhering to NCERT text book)</p> <p>Arthropoda</p> <p>Mollusca</p> <p>Echinodermata</p> <p>Hemichordata</p>	
<b>UNIT- IV</b>	<p><b>ANIMAL DIVERSITY - I I: PHYLUM : CHORDATA</b></p> <p><b>General Characters – Strictly restrict to 8 points only</b></p> <p><b>Classification up to Classes - Brief account only with two or three examples</b></p> <p>Phylum : Chordata</p> <p>Sub phylum: Urochordata</p> <p>Sub phylum: Cephalochordata</p> <p>Sub phylum : Vertebrata</p> <p>Super class: Agnatha</p> <p>Class Cyclostomata</p> <p>Super class: Gnathostomata</p> <p>Super class pisces</p> <p>Class: Chondrichthyes</p> <p>Class: Osteichthyes Tetrapoda</p> <p>Class: Amphibia (Include Frog as a type study strictly adhering to NCERT text book)</p> <p>Class: Reptilia</p> <p>Class: Aves</p> <p>Class: Mammalia</p>	
<b>UNIT- V</b>	<p><b>LOCOMOTION &amp; REPRODUCTION IN PROTOZOA</b></p> <p>Locomotion: Definition, types of locomotor structures pseudopodia (basic idea of pseudopodia without going into different types), flagella &amp; cilia (<b>Brief account giving two examples each</b>)</p> <p>Flagellar &amp; Ciliary movement – Effective &amp; Recovery strokes in Euglena, Synchronal &amp; Metachronal movements in Paramecium.</p> <p>Reproduction: Definition, types.</p> <p>Asexual Reproduction: Transeverse binary fission in Paramecium &amp; Longitudinal binary fission in Euglena.</p> <p>Multiple fission,</p> <p>Sexual Reproduction.</p>	
<b>UNIT- VI</b>	<p><b>BIOLOGY &amp; HUMAN WELFARE</b></p> <p>Parasitism and parasitic adaptation</p> <p><b>Health and disease:</b> introduction (follow NCERT) Life cycle, Pathogenecity, Treatment &amp; Prevention (Brief account only)</p> <ol style="list-style-type: none"> <li>1 Entamoeba histolytica</li> <li>2 Plasmodium vivax</li> <li>3 Ascaris lumbricoides</li> <li>4 Wuchereria bancrofti</li> </ol>	

	Brief account of pathogenecity, treatment & prevention of Typhoid, Pneumonia, Common cold, & Ring worm. Drugs and Alcohol absuse	
<b>UNIT- VII</b>	<b>Type study of Periplaneta americana</b> Habitat and habits External features Locomotion Digestive system Respiratory system Circulatory system Excretory system Nervous system – sense organs, structure of ommatidium. Reproductive system	
<b>UNIT- VIII</b>	<b>ECOLOGY &amp; ENVIRONMENT</b> <b>Organisms and Environment:</b> Ecology, population, communities, habitat, niche, biome and ecosphere (definitions only) <b>Ecosystem:</b> Elementary aspects only Abiotic factors - Light, Temperature & Water (Biological effects only), Ecological adaptations Population interactions <b>Ecosystems:</b> Types, Components, Lake ecosystem Food chains, Food web, Productivity and Energy flow in Ecosystem, Ecological pyramids – Pyramids of numbers, biomass and energy. Nutritient cycling – Carbon, Nitrogen, & Phosphorous cycles (Brief account) <b>Population attributes:</b> Growth, Natality and Mortality, Age distribution, Population regulation. Environmental issues	
<b>Topics deleted under 30% reduction of Syllabus due to COVID-19</b>		
<b>Unit-VII</b>	Periplaneta America (Cockroach) – Entire chapter deleted	175 - 202
<b>Unit-VIII</b>	<b>ECOLOGY &amp; ENVIRONMENT</b> 8.4- Ecosystem & their Components 8.5- Food chains, Food Webs, Productivity & Energy flow. 8.6- Nutrient cycle 8.8- Environmental Issues	

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**Subject : ZOOLOGY – II**

S. No.	Topics	Page No.
<b>UNIT-I</b>	<p><b>Human Anatomy and Physiology-I</b></p> <p><b>Unit I A: Digestion and absorption</b></p> <p>Alimentary canal and digestive glands; Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats, egestion, Calorific value of proteins, carbohydrates and fats (for box item- not to be evaluated); Nutritional disorders: Protein Energy Malnutrition (PEM), indigestion, constipation, vomiting, jaundice, diarrhea, Kwashiorkor.</p> <p><b>Unit I B: Breathing and Respiration</b></p> <p>Respiratory organs in animals; Respiratory system in humans; Mechanism of breathing and its regulation in humans - Exchange of gases, transport of gases and regulation of respiration; Respiratory volumes; Respiratory disorders: Asthma, Emphysema, Occupational respiratory disorders – Asbestosis, Silicosis, Siderosis, Black Lung Disease in coal miners.</p>	
<b>UNIT-II</b>	<p><b>Human Anatomy and Physiology-II</b></p> <p><b>Unit II A: Body Fluids and Circulation</b></p> <p>Covered in I year composition of lymph and functions; Clotting of blood; Human circulatory system – structure of human heart and blood vessels; Cardiac cycle, cardiac output, double circulation; regulation of cardiac activity; Disorders of circulatory system: Hypertension, coronary artery disease, angina pectoris, heart failure.</p> <p><b>Unit II B: Excretory products and their elimination</b></p> <p>Modes of excretion – Ammonotelism, Ureotelism, Uricotelism; Human excretory system – structure of kidney and nephron; Urine formation, osmoregulation; Regulation of kidney function –Renin-Angiotensin – Aldosterone system, Atrial Natriuretic Factor, ADH and diabetes insipidus; Role of other organs in excretion; Disorders: Uraemia, renal failure, renal calculi, nephritis, dialysis using artificial kidney.</p>	
<b>UNIT III</b>	<p><b>Human Anatomy and Physiology-III</b></p> <p><b>Unit IIIA: Muscular and Skeletal system</b></p> <p>Skeletal muscle – ultra structure; Contractile proteins &amp; muscle contraction; Skeletal system and its functions; Joints. (to be dealt with relevance to practical syllabus); Disorders of the muscular and</p>	

	<p>skeletal system: myasthenia gravis, tetany, muscular dystrophy, arthritis, osteoporosis, gout, regormortis.</p> <p><b>Unit III B: Neural control and co-ordination</b></p> <p>Nervous system in human beings – Central nervous system, Peripheral nervous system and Visceral nervous system; Generation and conduction of nerve impulse; Reflex action; Sensory perception; Sense organs; Brief description of other receptors; Elementary structure and functioning of eye and ear.</p>	
<b>UNIT IV</b>	<p><b>Human Anatomy and Physiology-IV</b></p> <p><b>Unit IVA: Endocrine system and chemical co-ordination</b></p> <p>Endocrineglands and hormones; Human endocrine system – Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads;Mechanism of hormone action (Elementary idea only); Role of hormones as messengers and regulators; Hypo and Hyper activity and related disorders: Common disorders –Dwarfism, acromegaly,cretinism, goiter, exophthalmic goiter, diabetes, Addison’s disease,Cushing’s syndrome.(Diseases &amp; disorders to be dealt in brief).</p> <p><b>Unit IVB: Immune system</b></p> <p>Basic concepts of Immunology - Types of Immunity - Innate Immunity, Acquired Immunity, Active and Passive Immunity, Cell mediated Immunity and Humoral Immunity, Interferon, HIV and AIDS.</p>	
<b>UNIT V</b>	<p><b>Human Reproduction</b></p> <p><b>Unit VA: Human Reproductive System</b></p> <p>Male and female reproductive systems; Microscopic anatomy of testis &amp; ovary; Gametogenesis “ Spermatogenesis &amp; Oogenesis; Menstrual cycle; Fertilization, Embryo development up to blastocyst formation, Implantation; Pregnancy, placenta formation, Parturition, Lactation (elementary idea).</p> <p><b>Unit VB: Reproductive Health</b></p> <p>Need for reproductive health and prevention of sexually transmitted diseases (STD); Birth control – Need and methods, contraception and medical termination of pregnancy (MTP); Amniocentesis; infertility and assisted reproductive technologies – IVF-ET, ZIFT, GIFT (elementary idea for general awareness).</p>	
<b>UNIT VI</b>	<p><b>Genetics</b></p> <p>Heredity and variation: Mendel’s laws of inheritance with reference to Drosophila. (Drosophila melanogaster Grey, Black body colour; Long, Vestigial wings), Pleiotropy; Multiple alleles: Inheritance of blood groups and Rh-factor; Co-dominance (Blood groups as example); Elementary idea of polygenic inheritance; Skin colour in humans (refer Sinnott, Dunn and</p>	

	Dobzhansky); Sex determination – in humans, birds, Fumea moth, genic balance theory of sex determination in <i>Drosophila melanogaster</i> and honey bees; Sex linked inheritance – Haemophilia, Colour blindness; Mendelian disorders in humans: Thalassaemia, Haemophilia, Sickle celled anaemia, cystiefibrosis PKU, Alkaptonuria; Chromosomal disorders – Down’s syndrome, Turner’s syndrome and Klinefelter syndrome; Genome, Human Genome Project and DNA Finger Printing,	
<b>UNIT VII</b>	<b>Organic Evolution</b> Origin of Life, Biological evolution and Evidences for biological evolution (palaeontological, comparative anatomical, embryological and molecular evidences); Theories of evolution: Lamarckism (in brief), Darwin’s theory of Evolution -Natural Selection with example (Kettlewell’s experiments on <i>Biston bitularia</i> ), Mutation Theory of Hugo De Vries; Modern synthetic theory of Evolution - Hardy-Weinberg law ; Types of Natural Selection; Gene flow and genetic drift; Variations (mutations and genetic recombination); Adaptive radiation – viz., Darwin’s finches and adaptive radiation in marsupials; Human evolution; Speciation – Allopatric, sympatric; Reproductive isolation.	
<b>Unit-VIII</b>	<b>AppliedBiology</b> Apiculture; Animal Husbandry: Pisciculture, Poultry management, Dairy management; Animal breeding; Bio-medical Technology : Diagnostic Imaging (X-ray, CTscan, MRI), ECG, EEG; Application of Biotechnology in health: Human insulin and vaccine production ; Gene Therapy; Transgenic animals; ELISA; Vaccines, MABs, Cancer biology, stem cells.	
<b>Topics deleted under 30% reduction of Syllabus due to COVID-19</b>		
<b>Unit –I</b>	<b>Human Anatomy and Physiology-I</b> <b>I A – Digestion and Absorption</b> – Total chapter	2 - 20
<b>Unit –III</b>	<b>Human Anatomy and Physiology-III</b> <b>III-A- Musculo Skeletal System</b> 3.2- The Skeleton 3.3- Joints 3.4- Disoreders of Muscular and Skeletal system	84 - 90

	<b>III-B- Neural control &amp; Co- ordination</b> 3.7- Reflex action and Reflex Arc. 3.8- Sensory Reception and Processing 3.8.1- The Eye 3.8.2- Mechanism of vision 3.8.3- The Ear (The stato- Aconstic Receptor) 3.8.4- Mechanism of Hearing only (Except disorders of Human Neural system)	110 - 117
<b>Unit-VII</b>	<b>Organic Evolution- Entire chapter deleted</b>	235 - 262
<b>Unit-VIII</b>	<b>Applied Biology</b> 8.1 Animal Husbandry 8.2 Poultry Farm management 8.3 Bee Keeping 8.4 Fishery management	264 – 274

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**Subject : PHYSICS – I**

<b>S. No.</b>	<b>Topics</b>	<b>Page No.</b>
<b>1</b>	<b>PHYSICAL WORLD</b> What is physics? Scope and excitement of physics Physics, technology and society Fundamental forces in nature Nature of physical laws	
<b>2</b>	<b>UNITS AND MEASUREMENTS</b> Introduction The international system of units Measurement of length Measurement of mass Measurement of time Accuracy, precision of instruments and errors in measurement Significant figures Dimensions of physical quantities Dimensional formulae and dimensional equations Dimensional analysis and its applications	
<b>3</b>	<b>MOTION IN A STRAIGHT LINE</b> <b>3.1</b> Introduction Position, path length and displacement Average velocity and average speed Instantaneous velocity and speed Acceleration Kinematic equations for uniformly accelerated motion Relative velocity	
<b>4</b>	<b>MOTION IN A PLANE</b> Introduction Scalars and vectors Multiplication of vectors by real numbers Addition and subtraction of vectors. graphical method Resolution of vectors Vector addition. analytical method Motion in a plane Motion in a plane with constant acceleration Relative velocity in two dimensions Projectile motion Uniform circular motion	
<b>5</b>	<b>LAWS OF MOTION</b> Introduction Aristotle's fallacy The law of inertia	



	<p>Newton's first law of motion  Newton's second law of motion  Newton's third law of motion  Conservation of momentum  Equilibrium of a particle  Common forces in mechanics, friction  Circular motion  Solving problems in mechanics</p>	
6	<p><b>WORK, ENERGY AND POWER</b>  Introduction  Notions of work and kinetic energy : The work- energy theorem  Work  Kinetic energy  Work done by a variable force  The work-energy theorem for a variable force  The concept of potential energy  The conservation of mechanical energy  The potential energy of a spring  Various forms of energy : the law of conservation of energy  Power  Collisions</p>	
7	<p><b>SYSTEM OF PARTICLES AND ROTATIONAL MOTION</b>  Introduction  Centre of mass, Centre of Gravity  Motion of centre of mass  Linear momentum of a system of particles  Vector product of two vectors  Angular velocity and its relation with linear velocity, Kinematics of rotational motion about a fixed axis  Torque and angular momentum  Equilibrium of a rigid body  Moment of inertia  Theorems of perpendicular and parallel axes  Dynamics of rotational motion about a fixed axis  Angular momentum in case of rotations about a fixed axis  Rolling motion</p>	
8	<p><b>OSCILLATIONS</b>  Introduction  Periodic and oscillatory motions  Simple harmonic motion  Simple harmonic motion and uniform circular motion  Velocity and acceleration in simple harmonic motion  Force law for Simple harmonic Motion  Energy in simple harmonic motion  Some systems executing Simple Harmonic Motion</p>	

	Damped simple harmonic motion Forced oscillations and resonance	
9	<b>GRAVITATION</b> Introduction Kepler's laws Universal law of gravitation The gravitational constant Acceleration due to gravity of the earth Acceleration due to gravity below and above the surface of earth Gravitational potential energy Escape speed Earth satellite Energy of an orbiting satellite Geostationary and polar satellites Weightlessness	
10	<b>Mechanical Properties of Solids</b> Introduction Elastic behaviour of solids Stress and strain Hooke's law Stress-strain curve Elastic moduli Applications of elastic behaviour of materials	
11	<b>MECHANICAL PROPERTIES OF FLUIDS</b> Introduction Pressure Streamline flow Bernoulli's principle Viscosity Reynolds number Surface tension	
12	<b>THERMAL PROPERTIES OF MATTER</b> Introduction Temperature and heat Measurement of temperature Ideal-gas equation and absolute temperature Thermal expansion Specific heat capacity Calorimetry Change of state Heat transfer Newton's law of cooling	
13	<b>THERMODYNAMICS</b> Introduction Thermal equilibrium Zeroth law of thermodynamics Heat, internal energy and work	

	First law of thermodynamics Specific heat capacity Thermodynamic state variables and equation of State Thermodynamic processes Heat engines Refrigerators and heat pumps Second law of thermodynamics Reversible and irreversible processes Carnot engine, Carnot's theorem	
<b>14</b>	<b>KINETIC THEORY</b> Introduction Molecular nature of matter Behaviour of gases Kinetic theory of an ideal gas Law of equipartition of energy Specific heat capacity Mean free path	
<b>Topics deleted under          30% reduction of Syllabus due to COVID-19</b>		
<b>1.</b>	<b>Motion in a Straight line</b> - Frame of reference	41
<b>2.</b>	<b>Laws of Motion</b> Law of inertia, Newton's First law of motion, Newton's second law of motion – momentum, impulse, Newton's Third law of motion.	94 – 102
<b>3.</b>	<b>System of Particles and Rotational motion</b> Theorems of Perpendicular and Parallel axes and their applications.	174 – 176
<b>4.</b>	<b>Gravitation</b> - Kepler laws of Planetary motion	221 – 222
<b>5.</b>	<b>Mechanical properties of solids</b> - Poisson's ratio, Elastic behavior of solids, Elastic potential energy in a Stretched wire (Strain energy)	251
<b>6.</b>	<b>Thermal properties of matter</b> - Heat transfer by conduction, Convection and Radiation	300 - 304
<b>7.</b>	<b>Thermodynamics</b> - Heat engines, Refrigerators and heat pumps	325-326

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**Subject : PHYSICS – II**

<b>S. No.</b>	<b>Topics</b>	<b>Page No.</b>
<b>1.</b>	<b>WAVES</b> INTRODUCTION Transverse and longitudinal waves Displacement relation in a progressive wave The speed of a travelling wave The principle of superposition of waves Reflection of waves Beats Doppler effect	
<b>2.</b>	<b>RAY OPTICS AND OPTICAL INSTRUMENTS</b> INTRODUCTION Reflection of Light by Spherical Mirrors Refraction Total Internal Reflection Refraction at Spherical Surfaces and by Lenses Refraction through a Prism Dispersion by a Prism Some Natural Phenomena due to Sunlight OPTICAL INSTRUMENTS	
<b>3.</b>	<b>WAVE OPTICS</b> Introduction Huygens Principle Refraction and reflection of plane waves using Huygens Principle Coherent and Incoherent Addition of Waves Interference of Light Waves and Young's Experiment Diffraction Polarisation	
<b>4.</b>	<b>ELECTRIC CHARGES AND FIELDS</b> INTRODUCTION Electric Charges Conductors and Insulators Charging by Induction Basic Properties of Electric Charge Coulomb's Law Forces between Multiple Charges Electric Field Electric Field Lines Electric Flux Electric Dipole Dipole in a Uniform External Field Continuous Charge Distribution Gauss's Law Application of Gauss's Law	

<p><b>5.</b></p>	<p><b>ELECTROSTATIC POTENTIAL AND CAPACITANCE</b>  INTRODUCTION  Electrostatic Potential  Potential due to a Point Charge  Potential due to an Electric Dipole  Potential due to a System of Charges  Equipotential Surfaces  Potential Energy of a System of Charges  Potential Energy in an External Field  Electrostatics of Conductors  Dielectrics and Polarisation  Capacitors and Capacitance  The Parallel Plate Capacitor  Effect of Dielectric on Capacitance  Combination of Capacitors  Energy Stored in a Capacitor  Van de Graaff Generator</p>	
<p><b>6.</b></p>	<p><b>CURRENT ELECTRICITY</b>  INTRODUCTION  Electric Current  Electric Currents in Conductors  Ohm's law  Drift of Electrons and the Origin of Resistivity  Limitations of Ohm's Law  Resistivity of various Materials  Temperature Dependence of Resistivity  Electrical Energy, Power  Combination of Resistors — Series and Parallel  Cells, emf, Internal Resistance  Cells in Series and in Parallel  Kirchhoff's Laws  Wheatstone Bridge  Meter Bridge  Potentiometer</p>	
<p><b>7.</b></p>	<p><b>MOVING CHARGES AND MAGNETISM</b>  INTRODUCTION  Magnetic Force  Motion in a Magnetic Field  Motion in Combined Electric and Magnetic Fields  Magnetic Field due to a Current Element, Biot-Savart Law  Magnetic Field on the Axis of a Circular Current Loop  Ampere's Circuital Law  The Solenoid and the Toroid  Force between Two Parallel Currents, the Ampere  Torque on Current Loop, Magnetic Dipole  The Moving Coil Galvanometer</p>	
<p><b>8.</b></p>	<p><b>MAGNETISM AND MATTER</b>  INTRODUCTION  The Bar Magnet  Magnetism and Gauss's Law  The Earth's Magnetism</p>	

	Magnetisation and Magnetic Intensity Magnetic Properties of Materials Permanent Magnets and Electromagnets	
<b>9.</b>	<b>ELECTROMAGNETIC INDUCTION</b> INTRODUCTION The Experiments of Faraday and Henry Magnetic Flux Faraday's Law of Induction Lenz's Law and Conservation of Energy Motional Electromotive Force Energy Consideration: A Quantitative Study Eddy Currents Inductance AC Generator	
<b>10.</b>	<b>ALTERNATING CURRENT</b> INTRODUCTION AC Voltage Applied to a Resistor Representation of AC Current and Voltage by Rotating Vectors — Phasors AC Voltage Applied to an Inductor AC Voltage Applied to a Capacitor AC Voltage Applied to a Series LCR Circuit Power in AC Circuit: The Power Factor LC Oscillations Transformers	
<b>11.</b>	<b>ELECTROMAGNETIC WAVES</b> INTRODUCTION Displacement Current Electromagnetic Waves Electromagnetic Spectrum	
<b>12.</b>	<b>DUAL NATURE OF RADIATION AND MATTER</b> INTRODUCTION Electron Emission Photoelectric Effect Experimental Study of Photoelectric Effect Photoelectric Effect and Wave Theory of Light Einstein's Photoelectric Equation: Energy Quantum of Radiation Particle Nature of Light: The Photon Wave Nature of Matter Davisson and Germer Experiment	
<b>13.</b>	<b>ATOMS</b> INTRODUCTION Alpha-particle Scattering and Rutherford's Nuclear Model of Atom Atomic Spectra Bohr Model of the Hydrogen Atom The Line Spectra of the Hydrogen Atom DE Broglie's Explanation of Bohr's Second Postulate of Quantisation	
<b>14.</b>	<b>NUCLEI</b> INTRODUCTION Atomic Masses and Composition of Nucleus Size of the Nucleus	

	Mass-Energy and Nuclear Binding Energy Nuclear Force Radioactivity Nuclear Energy	
<b>15.</b>	<b>SEMICONDUCTORELECTRONICS: MATERIALS,DEVICES AND SIMPLE CIRCUITS</b> INTRODUCTION Classification of Metals, Conductors and Semiconductors Intrinsic Semiconductor Extrinsic Semiconductor p-n Junction Semiconductor diode Application of Junction Diode as a Rectifier Special Purpose p-n Junction Diodes Junction Transistor Digital Electronics and Logic Gates Integrated Circuits	
<b>16.</b>	<b>COMMUNICATION SYSTEMS</b> INTRODUCTION Elements of a Communication System Basic Terminology Used in Electronic Communication Systems Bandwidth of Signals Bandwidth of Transmission Medium Propagation of Electromagnetic Waves Modulation and its Necessity Amplitude Modulation Production of Amplitude Modulated Wave Detection of Amplitude Modulated Wave	
<b>Topics deleted under 30% reduction of Syllabus due to COVID-19</b>		
<b>1.</b>	<b>Waves</b> - Doppler effected and its two situations	24 - 26
<b>2.</b>	<b>Ray Optics and Optical Instruments</b> - Reflection of light by spherical mirrors, the mirror equation. Scattering of light reddish appearance of the sun at sunrise and sunset and blue colors of sky.	40 – 45, 63 - 65
<b>3.</b>	<b>Wave Optics –</b> <b>Diffraction:</b> Resolving power of optical instruments (microscope and astronomical telescope) <b>Polarisation:</b> Polarisation of reflection (Brewster’s law) plane polarized light (uses) polaroids, polarization by scattering.	99 - 114
<b>4.</b>	<b>Electric Charges and Fields</b> - Application of Gauss’s law: Field due to uniformly charged thin spherical shell (field inside and outside)	155 - 163
<b>6.</b>	<b>Current Electricity</b> - Colour code for carbon resistors, series and parallel Combinations of resistors	229 - 331
<b>7.</b>	<b>Moving charges and magnetism</b> - Cyclofron	266 - 268
<b>8.</b>	<b>Magnetism and matter</b> - Magnetic field intensity due to a magnetic dipole (Bar magnet) along its axis and perpendicular to its axis (Bar magnet as an equivalent solenoid) , the dipole in a uniform magnet field Magnetic	321 - 327

	properties of materials (Para, dia and ferro) and its examples, permanent magnets and electromagnets.	
<b>10.</b>	<b>Alternating Current</b> -Power in AC circuit-The power factor, wattles current	392
<b>11.</b>	<b>Electromagnetic waves</b> - Displacement current	412
<b>12.</b>	<b>Dual natural of Radiation and matter</b> - Davisson and Germer experiment	449-450
<b>14.</b>	<b>Nuclei</b> - Radio activity (alpha, beta and gamma particles and their properties) Law of radio active decay, half life and mean life of a Radioactive material, Binding energy per nucleon and its variation with mass number.	496
<b>15.</b>	<b>Semi conductor electronics: materials, devices and simple circuits</b> Purpose of P-N junction diode 1. Zener diode and their characteristics 2. Zener diode as a voltage regulators.	530 – 538



<b>Sl. No</b>	<b>Name of the Chapter</b>	<b>Page No.</b>
<b>1.</b>	<p><b>ATOMIC STRUCTURE</b></p> <p>Sub- atomic particles</p> <p>Atomic models- Rutherford’s Nuclear model of atom</p> <p>Developments to the Bohr’s model of atom</p> <p>Nature of electromagnetic radiation.</p> <p>Particle nature of electromagnetic radiation- Planck’s quantum theory.</p> <p>Bohr’s model for Hydrogen atom.</p> <p>Explanation of line spectrum of hydrogen.</p> <p>Limitations of Bohr’s model</p> <p>Quantum mechanical considerations of sub atomic particles.</p> <p>Dual behaviour of matter.</p> <p>Heisenberg’s uncertainty principle.</p> <p>Quantum mechanical model of an atom. Important features Quantum mechanical model of atom.</p> <p>Orbitals and quantum numbers.</p> <p>Shapes of atomic orbitals.</p> <p>Energies of orbitals.</p> <p>Filling of orbitals in atoms. Aufbau Principle, Pauli’s exclusion Principle and Hund’s rule of maximum multiplicity.</p> <p>Electronic configurations of atoms.</p> <p>Stability of half filled and completely filled orbitals.</p>	
<b>2.</b>	<p><b>CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES</b></p> <p>Need to classify elements</p> <p>Genesis of periodic classification.</p> <p>Modern periodic law and present form of the periodic table.</p> <p>Nomenclature of elements with atomic number greater than 100</p> <p>Electronic configuration of elements and the periodic table</p> <p>Electronic configuration and types of Elements s,p,d.and f blocks.</p> <p>Trends in physical properties:</p> <p>(a) Atomic radius</p> <p>(b) Ionic radius</p> <p>(c) Variation of size in inner transition elements.</p> <p>(d) Ionization enthalpy.</p> <p>(e) Electron gain enthalpy</p> <p>(f) Electro negativity.</p> <p>Periodic trends in chemical properties:</p> <p>(a) Valence or Oxidation states.</p> <p>(b) Anomalous properties of second period elements – diagonal relationship.</p> <p>Periodic trends and chemical reactivity</p>	

<p><b>3.</b></p>	<p><b>CHEMICAL BONDING AND MOLECULAR STRUCTURE</b></p> <p>Kossel – Lewis approach to chemical bonding.</p> <p>Ionic or electrovalent bond - Factors favourable for the formation of ionic compounds-Crystal structure of sodium chloride-General properties of ionic compounds.</p> <p>Bond Parameters – bond length, bond angle, and bond enthalpy, bond order, resonance-Polarity of bonds dipole moment</p> <p>Valence Shell Electron Pair Repulsion (VSEPR) theories. Predicting the geometry of simple molecules.</p> <p>Valence bond theory-Orbital overlap concept-Directional properties of bonds-overlapping of atomic orbitals strength of sigma and pi bonds-Factors favouring the formation of covalent bonds</p> <p>Hybridisation- different types of hybridization involving s, p and d orbitals- shapes of simple covalent molecules.</p> <p>Coordinate bond –definition with examples.</p> <p>Molecular orbital theory – Formation of molecular orbitals, Linear combination of atomic orbitals (LCAO)-conditions for combination of atomic orbitals - Energy level diagrams for molecular orbitals - Bonding in some homo nuclear diatomic molecules- H<sub>3</sub>,He<sub>3</sub>,Li<sub>3</sub>,B<sub>3</sub>,C<sub>3</sub>,N<sub>3</sub>,and O<sub>3</sub></p> <p>Hydrogen bonding-cause of formation of hydrogen bond- Types of hydrogen bonds-inter and intra molecular-General properties of hydrogen bonds.</p>	
<p><b>4.</b></p>	<p><b>STATES OF MATTER: GASES AND LIQUIDS</b></p> <p>Intermolecular forces</p> <p>Thermal Energy</p> <p>Intermolecular forces Vs Thermal interactions.</p> <p>The Gaseous State.</p> <p>The Gas Laws</p> <p>Ideal gas equation.</p> <p>Graham’s law of diffusion – Dalton’s Law of partial pressures.</p> <p>Kinetic molecular theory of gases.</p> <p>Kinetic gas equation of an ideal gas (No derivation) deduction of gas laws from Kinetic gas equation.</p> <p>Distribution of molecular speeds – rms, average and most probable speeds-Kinetic energy of gas molecules.</p> <p>Behaviour of real gases – Deviation from Ideal gas behaviour – Compressibility factor Vs Pressure diagrams of real gases.</p> <p>Liquefaction of gases</p> <p>Liquid State – Properties of Liquids in terms of Inter molecular interactions – Vapour pressure, Viscosity and Surface tension (Qualitative idea only. No mathematical derivation)</p>	
<p><b>5.</b></p>	<p><b>STOICHIOMETRY</b></p> <p>Some Basic Concepts – Properties of matter – uncertainty in Measurement-significant figures, dimensional analysis.</p> <p>Laws of Chemical Combinations – Law of Conservation of Mass, Law of Definite Proportions, Law of Multiple Proportions, Gay Lussac’s Law of</p>	

	<p>Gaseous Volumes, Dalton's Atomic Theory, Avogadro Law, Principles, Examples.</p> <p>Atomic and molecular masses- mole concept and molar mass concept of equivalent weight.</p> <p>Percentage composition of compounds and calculations of empirical and molecular formulae of compounds.</p> <p>Stoichiometry and stoichiometric calculations.</p> <p>Methods of Expressing concentrations of solutions-mass percent, mole fraction, molarity, molality and normality.</p> <p>Redox reactions-classical idea of redox reactions, oxidation and reduction reactions-redox reactions in terms of electron transfer.</p> <p>Oxidation number concept.</p> <p>Types of Redox reactions-combination, decomposition, displacement and disproportionation reactions</p> <p>Balancing of redox reactions – oxidation number method Half reaction (ion-electron) method.</p> <p>Redox reactions in Titrimetry.</p>	
<p><b>6.</b></p>	<p><b>THERMODYNAMICS</b></p> <p>Thermodynamic Terms.</p> <p>The system and the surroundings.</p> <p>Types of systems and surroundings. The state of the system.</p> <p>The Internal Energy as a State Function.</p> <p>(a) Work (b) Heat (c) The general case, the first law of Thermodynamics.</p> <p>Applications.</p> <p style="padding-left: 40px;">Work</p> <p style="padding-left: 40px;">Enthalpy, H- a useful new state function</p> <p style="padding-left: 40px;">Extensive and intensive properties.</p> <p style="padding-left: 40px;">Heat capacity</p> <p>The relationship between <math>C_p</math> and <math>C_v</math>.</p> <p>Measurement of <math>\Delta U</math> and <math>\Delta H</math>: Calorimetry</p> <p>Enthalpy change, <math>\Delta H</math> of reactions – reaction Enthalpy</p> <p>(a) Standard enthalpy of reactions.</p> <p>(b) Enthalpy changes during transformations.</p> <p>(c) Standard enthalpy of formation.</p> <p>(d) Thermo chemical equations.</p> <p>(e) Hess's law of constant Heat summation.</p> <p>Enthalpies for different types of reactions.</p> <p>(a) Standard enthalpy of combustion (<math>\Delta_c H^\ominus</math>)</p> <p>(b) Enthalpy of atomization (<math>\Delta_a H^\ominus</math>), phase transition, sublimation and ionization.</p> <p>(c) Bond Enthalpy (<math>\Delta_{\text{bond}} H^\ominus</math>)</p> <p>(d) Enthalpy of solution (<math>\Delta_{\text{sol}} H^\ominus</math>) and dilution.</p> <p>Spontaneity.</p> <p>(a) Is decrease in enthalpy a criterion for spontaneity?</p> <p>(b) Entropy and spontaneity, *the second law of thermodynamics.</p>	

	<p>(c) Gibbs Energy and spontaneity.  Gibbs Energy change and equilibrium.  Absolute entropy and the third law of thermodynamics.</p>	
<b>7.</b>	<p><b>CHEMICAL EQUILIBRIUM AND ACIDS-BASES</b></p> <p>Equilibrium in Physical process.  Equilibrium in chemical process – Dynamic Equilibrium  Law of chemical Equilibrium - Law of mass action and Equilibrium constant.  Homogeneous Equilibria, Equilibrium constant in gaseous systems.  Relationship between <math>K_P</math> and <math>K_C</math>  Heterogeneous Equilibria.  Applications of Equilibrium constant.  Relationship between Equilibrium constant <math>K</math>, reaction quotient <math>Q</math> and Gibbs energy <math>G</math>.  Factors affecting Equilibria.-Le-chatlieprinciple application to industrial synthesis of Ammonia and Sulphur trioxide.  Ionic Equilibrium in solutions.  Acids, bases and salts- Arrhenius, Bronsted-Lowry and Lewis concepts of acids and bases.  Ionisation of Acids and Bases –Ionisation constant of water and it's ionic product- pH scale-ionisation constants of weak acids-ionisation of weak bases-relation between <math>K_a</math> and <math>K_b</math>-Di and poly basic acids and di and poly acidic Bases- Factors affecting acid strength-Common ion effect in the ionization of acids and bases-Hydrolysis of salts and pH of their solutions.  Buffer solutions-designing of buffer solution-Preparation of Acidic buffer  Solubility Equilibria of sparingly soluble salts. Solubility product constant  Common ion effect on solubility of Ionic salts.</p>	
<b>8.</b>	<p><b>HYDROGEN AND ITS COMPOUNDS</b></p> <p>Position of hydrogen in the periodic table.  Dihydrogen-Occurance and Isotopes.  Preparation of Dihydrogen  Properties of Dihydrogen  Hydrides: Ionic, covalent, and non-stiochiometric hydrides.  Water: Physical properties; structure of water, ice. Chemical properties of water; hard and soft water Temporary and permanent hardness of water  Hydrogen peroxide: Preparation; Physical properties; structure and chemical properties; storage and uses.  Heavy Water  Hydrogen as a fuel.</p>	
<b>9.</b>	<p><b>THE s – BLOCK ELEMENTS</b></p>	

	<p align="center"><b>(ALKALI AND ALKALINE EARTH METALS)</b></p> <p><b>Group 1 Elements</b></p> <p>Alkali metals; Electronic configurations;</p> <p>Atomic and Ionic radii; Ionization enthalpy; Hydration enthalpy; Physical properties; Chemical properties; Uses</p> <p>General characteristics of the compounds of the alkali metals: Oxides; Halides; Salts of Oxy Acids.</p> <p>Anomalous properties of Lithium:</p> <p>Differences and similarities with other alkali metals. Diagonal relationship; similarities between Lithium and Magnesium.</p> <p>Some important compounds of Sodium:</p> <p>Sodium Carbonate; Sodium Chloride; Sodium Hydroxide; Sodium hydrogen carbonate.</p> <p>Biological importance of Sodium and Potassium.</p> <p><b>Group 2 Elements:</b></p> <p>Alkaline earth elements; Electronic configuration; Ionization enthalpy; Hydration enthalpy; Physical properties, Chemical properties; Uses.</p> <p>General characteristics of compounds of the Alkaline Earth Metals: Oxides, hydroxides, halides, salts of Oxyacids (Carbonates; Sulphates and Nitrates).</p> <p>Anomalous behavior of Beryllium; its diagonal relationship with Aluminum.</p> <p>Some important compounds of calcium: Preparation and uses of Calcium Oxide ; Calcium Hydroxide; Calcium Carbonate;Plaster of Paris; Cement.</p> <p>Biological importance of Calcium and Magnesium.</p>	
<p><b>10.</b></p>	<p><b>P- BLOCK ELEMENTS GROUP 13 ( BORON FAMILY)</b></p> <p>General introduction – Electronic configuration, Atomic radii, Ionization enthalpy, Electro negativity; Physical &amp; Chemical properties.</p> <p>Important trends and anomalous properties of boron.</p> <p>Some important compounds of boron – Borax, Ortho boric acid, diborane.</p> <p>Uses of boron, aluminium and their compounds.</p>	
<p><b>11.</b></p>	<p><b>p-BLOCK ELEMENTS - GROUP 14 ( CARBON FAMILY)</b></p> <p>11.1 General introduction - Electronic configuration, Atomic radii, Ionization enthalpy, Electro negativity; Physical &amp; Chemical properties.</p>	

	<p>Important trends and anomalous properties of carbon.</p> <p>Allotropes of carbon.</p> <p>Uses of carbon.</p> <p>Some important compounds of carbon and silicon – carbon monoxide, carbon dioxide, Silica, silicones, silicates and zeolites.</p>	
<b>12.</b>	<p><b>ENVIRONMENTAL CHEMISTRY</b></p> <p>Definition of terms: Air, Water and Soil Pollutions.</p> <p>Environmental Pollution</p> <p>Atmospheric pollution; Tropospheric Pollution;</p> <p>Gaseous Air Pollutants (Oxides of Sulphur; Oxides of Nitrogen; Hydro Carbons; Oxides of Carbon (CO; CO<sub>2</sub>).</p> <p>Global warming and Green house effect.</p> <p>Acid Rain- Particulate Pollutants- Smog.</p> <p>Stratospheric Pollution: Formation and breakdown of Ozone- Ozone hole- effects of depletion of the Ozone layer.</p> <p>Water Pollution: Causes of Water Pollution; International standards for drinking water.</p> <p>Soil Pollution: Pesticides, Industrial Wastes.</p> <p>Strategies to control environmental pollution- waste Management- collection and disposal.</p> <p>Green Chemistry: Green chemistry in day-to-day life; Dry cleaning of clothes; Bleaching of paper; Synthesis of chemicals</p>	
<b>13.</b>	<p><b>ORGANIC CHEMISTRY-SOME BASIC PRINCIPLES AND TECHNIQUES AND HYDROCARBONS</b></p> <p>General introduction.</p> <p>Tetravalency of Carbon: shapes of organic compounds.</p> <p>Structural representations of organic compounds.</p> <p>Classification of organic compounds.</p> <p>Nomenclature of organic compounds.</p> <p>Isomerism.</p> <p>Fundamental concepts in organic reaction mechanisms.</p> <p>Fission of covalent bond.</p> <p>Nucleophiles and electrophiles.</p> <p>Electron movements in organic reactions.</p> <p>Electron displacement effects in covalent bonds.</p> <p>Types of Organic reactions.</p>	

	<p>Methods of purification of organic compounds.</p> <p>Qualitative elemental analysis of organic compounds.</p> <p>Quantitative elemental analysis of organic compounds.</p> <p><b>HYDROCARBONS</b></p> <p>Classification of Hydrocarbons.</p> <p>Alkanes – Nomenclature, isomerism (structural and conformations of ethane only)</p> <p>Preparation of alkanes Properties – Physical properties and chemical Reactivity, Substitution reactions – Halogenation(free radical mechanism), Combustion, Controlled Oxidation, Isomerisation, Aromatization, reaction with steam and Pyrolysis.</p> <p>Alkenes- Nomenclature, structure of ethane, Isomerism (structural and geometrical).</p> <p>Methods of preparation.</p> <p>Properties- Physical and chemical reactions: Addition of Hydrogen, halogen, water, sulphuric acid, Hydrogen halides (Mechanism- ionic and peroxide effect, Markovnikov's , antiMarkovnikov's or Kharasch effect). Oxidation, Ozonolysis and Polymerization.</p> <p><b>Alkynes</b> – Nomenclature and isomerism, structure of acetylene. Methods of preparation of acetylene.</p> <p>Physical properties, Chemical reactions- acidic character of acetylene, addition reactions- of hydrogen, Halogen, Hydrogen halides and water. Polymerization.</p> <p><b>Aromatic Hydrocarbons:</b> Nomenclature and isomerism. Structure of benzene, Resonance and aromaticity.</p> <p>Preparation of benzene. Physical properties. Chemical properties: Mechanism of electrophilic substitution. Electrophilic substitution reactions- Nitration, Sulphonation, Halogenation, Friedel-Craft' alkylation and acylation.</p> <p>Directive influence of functional groups in mono substituted benzene, Carcinogenicity and toxicity.</p>		
<p><b>Topics deleted under</b></p> <p><b>30% reduction of Syllabus due to COVID-19</b></p>			
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4	States of Matter: Gases & Liquids	(4.10) Distribution of molecular speeds RMS, average and most probable speeds – Kinetic energy of gas molecules (4.10.1)	127, 129 132

		(4.12) Liquefaction of gases (4.13) Liquid state – Properties of liquid in terms of inter molecular interactions – Vapour pressure, Viscosity and surface tension (Quantitative ideal only, no mathematical derivations)	134
5	Stoichiometry	(5.1) Some Basic Concepts (5.2.4) Gay lussac’s law of gaseous (5.2.5) Avogadro law (5.2.6) Volumes Daltons atomic theory (5.11) Redox reactions in Titrimetry	142 153 154 154 183
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8	Hydrogen and its Compounds	(8.3) Preparation of Di hydrogen (8.4) Properties of Di hydrogen (8.7) Hydrogen peroxide, Preparation, Physical properties , Structure and chemical properties , storage & uses	281 281 287
9	S-Block elements (Alkali and Alkaline earth metals)	(9.4) Some important Compounds of Sodium: Sodium Carbonate, Sodium hydroxide and Sodium Hydrogen Carbonate (9.5) Biological importance of Sodium and Potassium. (9.9) Calcium oxide and calcium carbonate (9.10) Biological importance of magnesium and calcium	299 – 301  301 305 307
10	<b>P-Block elements</b>	<b>(10.1.6) (ii) Aluminum reactivity towards acids &amp; alkalies</b> <b>(10.3) Some important Compounds of Boron- Borax, ortho Boric acid, Diborane.</b> <b>(11.5) Some important Compounds of Carbon and silicon</b>	314 316 327
11	Environmental Chemistry	Entire unit	
12	<b>Organic Chemistry</b> <b>Some Basic principles and techniques</b>	<b>(13.8) Methods of Purification of organic compounds</b> <b>(13.9) Qualitative elemental analysis of organic compounds</b> <b>(13.10) Quantitative element analysis of organic compounds</b>	375 381 383
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**Board of Intermediate Education, Andhra Pradesh.**  
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1.	<p><b>SOLIDSTATE</b></p> <p>1.1 General characteristics of solid state            1.2 Amorphous and crystalline solids            1.3 Classification of crystalline solids based on different binding forces (molecular, ionic, metallic and covalent solids )            1.4 Probing the structure of solids: X-ray crystallography            Crystal lattices and unit cells .Bravais lattices primitive and centred unit cells            Number of atoms in a unit cell (primitive, body centred and face centred cubic unit cell)            1.7 Close packed structures: Close packing in one dimension, in two dimensions and in three dimensions- tetrahedral and octahedral voids- formula of a compound and number of voids filled- locating tetrahedral and octahedral voids            1.8 Packing efficiency in simple cubic, bcc and in hcp, ccp lattice. 1.9 Calculations involving unit cell dimensions- density of the unit cell. 1.10 Imperfections in solids-types of point defects-stoichiometric and non-stoichiometric defects 1.11 Electrical properties-conduction of electricity in metals, semiconductors and insulators- band theory of metals 1.12 Magnetic properties</p>	
2.	<p><b>SOLUTIONS</b></p> <p>2.1 Types of solutions 2.2 Expressing concentration of solutions- mass percentag, volume percentage, mass by volume percentage, parts per million, mole fraction, molarity and molality 2.3 Solubility: Solubility of a solid in a liquid, solubility of a gas in a liquid, Henry's law 2.4 Vapour pressure of liquid solutions: vapour pressure of liquid- liquid solutions. Raoult's law as a special case of Henry's law - vapour pressure of solutions of solids in liquids 2.5 Ideal and non-ideal solutions 2.6 Colligative properties and determination of molar mass-relative lowering of vapour pressure- elevation of boiling point-depression of freezing point-osmosis and osmotic pressure-reverse osmosis and water purification. 2.7 Abnormal molar masses-van't Hoff factor</p>	
3.	<p><b>ELECTROCHEMISTRY AND CHEMICAL KINETICS</b></p> <p><b>ELECTROCHEMISTRY</b></p> <p>3.1 Electrochemical cells 3.2 Galvanic cells :measurement of electrode potentials 3.3 Nernst equation-equilibrium constant from Nernst equation- electrochemical cell and Gibbs energy of the cell reaction 3.4 Conductance of electrolytic solutions- measurement of the conductivity of ionic solutions- variation of conductivity and molar conductivity with concentration-strong electrolytes and weak electrolytes-applications of Kohlrausch's law 3.5 Electrolytic cells and electrolysis: Faraday's laws of electrolysis-products of electrolysis 3.6 Batteries: primary batteries and secondary batteries 3.7 Fuel cells 3.8 Corrosion of metals-Hydrogen economy</p> <p><b>CHEMICAL KINETICS</b></p> <p>3.9 Rate of a chemical reaction 3.10 Factors influencing rate of a reaction:</p>	

	<p>dependence of rate on concentration- rate expression and rate constant- order of a reaction, molecularity of a reaction</p> <p>3.11 Integrated rate equations-zero order reactions-first order reactions- half life of a reaction 3.12 Pseudo first order reaction</p> <p>3.13 Temperature dependence of the rate of a reaction -effect of catalyst 3.14 Collision theory of chemical reaction rates</p>	
4.	<p><b>SURFACE CHEMISTRY</b></p> <p>4.1 Adsorption and absorption: Distinction between adsorption and absorption-mechanism of adsorption-types of adsorption- characteristics of physisorption-characteristics of chemisorptions- adsorption isotherms- adsorption from solution phase- applications of adsorption 4.2 Catalysis: Catalysts, promoters and poisons-auto catalysis- homogeneous and heterogeneous catalysis-adsorption theory of heterogeneous catalysis- important features of solid catalysts: (a)activity (b)selectivity- shape-selective catalysis by zeolites- enzyme catalysis- characteristics and mechanism- catalysts in industry 4.3 Colloids</p> <p>4.4 Classification of colloids: Classification based on physical state of dispersed phase and dispersion medium- classification based on nature of interaction between dispersed phase and dispersion medium- classification based on type of particles of the dispersed phase- multi molecular, macromolecular and associated colloids-cleansing action of soaps-preparation of colloids-purification of colloidal solutions- properties of colloidal solutions: Tyndal effect, colour, Brownian movement-charge on colloidal particles, electrophoresis 4.5 Emulsions 4.6 Colloids Around us- application of colloids</p>	
5.	<p><b>GENERAL PRINCIPLES OF METALLURGY</b></p> <p>5.1 Occurance of metals 5.2 Concentration of ores- levigation, magnetic separation, froth floatation, leaching 5.3 Extraction of crude metal from concentrated ore-conversion to oxide, reduction of oxide to the metal 5.4 Thermodynamic principles of metallurgy-Ellingham diagram-limitations-applications-extraction of iron, copper and zinc from their oxides</p> <p>5.5 Electrochemical principles of metallurgy 5.6 Oxidation and reduction 5.7 Refining of crude metal-distillation, liquation poling, electrolysis, zone refining and vapour phase refining 5.8 Uses of aluminium, copper, zinc and iron</p>	
6.	<p><b>p-BLOCK ELEMENTS</b></p> <p><b>GROUP-15 ELEMENTS</b></p> <p>6.1 Occurance- electronic configuration, atomic and ionic radii, ionisation energy, electronegativity, physical and chemical properties 6.2 Dinitrogen-preparation, properties and uses 6.3 Compounds of nitrogen-preparation and properties of ammonia</p> <p>6.4 Oxides of nitrogen 6.5 Preparation and properties of nitric acid 6.6 Phosphorous-allotropic forms 6.7 Phosphine- preparation and properties 6.8 Phosphorous halides 6.9 Oxoacids of phosphorous</p> <p><b>GROUP-16 ELEMENTS</b></p> <p>6.10 Occurance- electronic configuration, atomic and ionic radii, ionisation enthalpy, electron gain enthalpy, electronegativity, physical and chemical properties 6.11 Dioxygen-preparation, properties and uses 6.12 Simple oxides</p> <p>6.13 Ozone-preparation, properties, structure and uses 6.14 Sulphur-allotropic forms 6.15 Sulphur dioxide-preparation, properties and uses 6.16 Oxoacids of</p>	

	<p>6.17 Sulphuric acid-industrial process of manufacture, properties and uses</p> <p><b>ELEMENTS</b></p> <p>6.18 Occurance, electronic configuration, atomic and ionic radii, ionisation enthalpy, electron gain enthalpy, electronegativity ,physical and chemical properties 6.19 Chlorine-preparation, properties and uses 6.20 Hydrogen chloride- preparation, properties and uses 6.21 Oxoacids of halogens 6.22 Interhalogen compounds</p> <p><b>GROUP-18ELEMENTS</b></p> <p>6.23 Occurance, electronic configuration, ionisation enthalpy,atomic radii electron gain enthalpy, physical and chemical properties(a) Xenon-fluorine compounds- XeF<sub>2</sub>,XeF<sub>4</sub> and XeF<sub>6</sub> –preparation,hydrolysis and formation of fluoro anions- structures of XeF<sub>2</sub>, XeF<sub>4</sub> and XeF<sub>6</sub> (b) Xenon-oxygen compounds XeO<sub>3</sub> and XeOF<sub>4</sub> - their formation and structures</p>	
7.	<p><b>d AND f BLOCK ELEMENTS &amp; COORDINATION COMPOUNDS</b></p> <p><b>d AND f BLOCK ELEMENTS</b></p> <p>7.1 Position in the periodic table 7.2 Electronic configuration of the d-block elements 7.3 General properties of the transition elements (d-block) -physical properties, variation in atomic and ionic sizes of transition series, ionisation enthalpies, oxidation states,trends in the <math>M^{2+}/M</math> and <math>M^{3+}/M^{2+}</math> standard electrode potentials, trends in stability of higher oxidation states, chemical reactivity and <math>E^J</math> values, magnetic properties, formation of coloured ions, formation of complex compounds,catalytic properties, formation of interstitial compounds, alloy formation</p> <p>7.4 Some important compounds of transition elements-oxides and oxoanions of metals-preparation and properties of potassium dichromate and potassium permanganate-structures of chromate,dichromate,manganate and permanganate ions 7.5 Inner transition elements(f-block)-lanthanoids-electronic configuration-atomic and ionic sizes-oxidation states- general characteristics 7.6 Actinoids-electronic configuration atomic and ionic sizes, oxidation states, general characteristics and comparision with lanthanoids 7.7 Some applications of d and f block elements</p> <p><b>COORDINATION COMPOUNDS</b></p> <p>7.8 Werner’s theory of coordination compounds 7.9 Definitions of some terms used in coordination compounds 7.10 Nomenclature of coordination compounds-IUPAC nomenclature</p> <p>7.11 Isomerism in coordination compounds-(a)Stereo isomerism- Geometrical and optical isomerism (b)Structural isomerism- linkage, coordination, ionisation and solvate isomerism 7.12 Bonding in coordination compounds. (a)Valence bond theory - magnetic properties of coordination compounds-limitations of valence bond theory (b) Crystal field theory (i) Crystal field splitting in octahedral and tetrahedral coordination entities (ii) Colour in coordination compounds-limitations of crystal field theory 7.13 Bonding in metal carbonyls 7.14 Stability of coordination compounds 7.15 Importance and applications of coordination compounds</p>	
8.	<p><b>POLYMERS</b></p> <p>8.1 Classification of Polymers -Classification based on source,structure, mode of polymerization, molecular forces and growth polymerization 8.2 Types of</p>	

	<p>polymerization reactions- addition polymerization or chain growth polymerization- ionic polymerization, free radical mechanism-preparation of addition polymers- polythene,teflon and polyacrylonitrile-condensation polymerization or step growth polymerization-polyamides- preparation of Nylon 6,6 and nylon 6-poly esters- terylene- bakelite,melamine,formaldehyde polymer- copolymerization- Rubber- natural rubber-vulcanisation of rubber-Synthetic rubbers- preparation of neoprene and buna-N 8.3 Molecular mass of polymers-number average and weight average molecular masses- poly dispersity index(PDI) 8.4 Biodegradable polymers- PHBV, Nylon 2-nylon 6 8.5 Polymers of commercial importance- poly propene, poly styrene,poly vinyl chloride(PVC), urea- formaldehyde resin, glyptal, bakelite- their monomers, structures and uses</p>	
9.	<p><b>BIOMOLECULES</b></p> <p>9.1 Carbohydrates - Classification of carbohydrates- Monosaccharides: preparation of glucose from sucrose and starch- Properties and structure of glucose- D,L and (+), (-) configurations of glucose- Structure of fructose Disaccharides: Sucrose- preparation, structure-Invert sugar- Structures of maltose and lactose-Polysaccharides: Structures of starch cellulose and glycogen- Importance of carbohydrates 9.2 Aminoacids: Natural aminoacids-classification of aminoacids - structures and D and L forms-Zwitter ions Proteins: Structures, classification, fibrous and globular- primary, secondary, tertiary and quarternary structures of proteins- Denaturation of proteins 9.3 Enzymes: Enzymes,mechanism of enzyme action 9.4 Vitamins: Explanation-names- classification of vitamins - sources of vitamins-deficiency diseases of different types of vitamins 9.5. Nucleic acids: chemical composition of nucleic acids, structures of nucleic acids, DNA finger printing biological functions of nucleic acids 9.6 Hormones:Definition, different types of hormones, their production, biological activity, diseases due to their abnormal activities.</p>	
10.	<p><b>CHEMISTRY IN EVERYDAYLIFE</b></p> <p>10.1 Drugs and their classification: (a) Classification of drugs on the basis of pharmacological effect(b) Classification of drugs on the basis of drug action (c) Classification of drugs on the basis of chemical structure (d) Classification of drugs on the basis of molecular targets 10.2 Drug-Target interaction-Enzymes as drug targets(a) Catalytic action of enzymes (b) Drug-enzyme interaction Receptors as drug targets 10.3 Therapeutic action of different classes of drugs: antacids, antihistamines, neurologically active drugs: tranquilizers, analgesics– non- narcotic,narcotic analgesics, antimicrobials-antibiotics,antiseptics and disinfectants- antifertility drugs 10.4 Chemicals in food- artificial sweetening agents, food preservatives, antioxidants in food 10.5 Cleansing agents-soaps and synthetic detergents</p>	
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