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**Boards** & aim top **Tech-schools**

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**IIT-JEE AIEEE BITSAT**

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**1472** PAGE students got admission offers from top-tech schools like **IITS, NITs, BITS Pilani** and others like Amrita, Dhirubai, Karunya, Kalinga, LNMittal, Manipal, SRM, Symbiosis since year 2004



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Modular learning helps student address his/her weak areas and extend flexibility to choose topics without being repetitive after long school or college working hours.

PAGE lends a new dimension to the classroom coaching in terms of flexible, cost effective content delivery to the specific requirements of the students.

Besides giving students a distinct advantage of high scores in **board exams**, the modular learning ensures the right foundation to tackle **admission tests of Top Tech-schools**.

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# Score - Boards

## **A program for class XI / Junior Inter students**

A very basic course aiming at maximum score in Mathematics, Physics and Chemistry in Intermediate, CBSE, ISC board examinations.

It's a unique modular teaching methodology designed exclusively to supplement your school/college studies.

*Score - Boards* students got admission offers from Anna university, SASTRA, SSN & UPES based on their Board examination performance.

Very High scores in Board Examination matters a lot for students seeking admission in foreign universities.

## **Features**

- 25 students per batch for personalized training.
- Content delivery by senior teachers only.
- Duration of module-35 sessions of each 1 hour duration.
- Air conditioned classrooms.
- Batch timings : 5 pm to 6 pm or 6 pm to 7 pm or 7 pm to 8 pm.

**Physics - 2 Modules**

**Chemistry - 2 Modules**

**Maths - 4 Modules**

1 module Rs.5000/-

More than one Rs.4500/module

All 8 modules Rs.30,000/-

Score board programme is flexible and students can enroll for 1 module / more than 1 module / 4 module at one point of the time.

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# *Multi-Score*

It is an advanced integrated training program exclusively designed to tackle admission tests of India's Top-Tech Schools.

But, just in case, you miss to get through one of those highest level ones like IIT-JEE, you definitely have no reason to worry.

Our advanced course is so comprehensive that it covers all the relevant content related to AIEEE, BITSAT and admission tests of Amrita, Dhirubhai Ambani, GITAM, Kalinga, Karunya, LN Mittal, Manipal, SRM, Symbiosis, UPES & VIT.

Batch strength      40 students.

Timing                5:30 am to 7: 30 am.

For CBSE XII / ISC XII / Senior Inter Students only

Course Fee : Rs.30,000

## **Features :**

- 1) 4 level Class Room Practice Sheets Assignments, Chapter wise sheets
- 2) National level Integrated tests
- 3) Mock tests for IIT - JEE, AIEEE, VIT, AMRITA, SRM.  
Manipal & Gitam online tests after respective board exams.
- 4) BITSAT, Logic & Language with 15 online tests
- 5) Top Tech Schools Admission processing & Selection counselling.

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## FAQs

### **Why *Score – Boards* program for 10 + 2 students?**

*Score – Boards* programme helps to have a strong foundation at basic level with at most clarity in fundamentals which enhance students descriptive presentation skill to score maximum in respective board exams. Now 10 + 2 is no more a qualifying exam for various tech schools but many top tech schools admit students in Engineering on the basis of 10 + 2 science percentage .

### **What is the philosophy of *Multi-Score* and how it is planned?**

The course philosophy is very simple - focus on the fundamentals.

The *Multi-Score* program goes beyond the limitations of conventional test preparation techniques and challenges the fundamental knowledge base. The sessions take you through the fundamentals of Physics Chemistry and Mathematics through relevant concepts and exercises to reinforce them. Only when you have a firm grasp of the basics do the actual test preparation sessions unfold. At PAGE, each topic is introduced in the depth and width it deserves with respect to its scope in board exams. This is followed by exhaustive numerical problem-solving exercises on these topics. Students are encouraged to first try on their own without the Instructors' assistance.

### **Are all the Instructors experienced?**

At PAGE, it is the people behind the process that add value to your education. At PAGE, you will be trained by people with expertise in relevant subjects and are in tune with the latest exam patterns, they even solve the actual test on the test day, year after year to post them on the Institute's website.

PAGE faculty do much more than teach, they guide and encourage students and help them in realizing their maximum potential.

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### **How often do you evaluate students?**

Efficient time-management and smart study, is what matters most in doing well. We have developed efficient evaluation methodology that lets you constantly assess your examination strategies and benchmark your performance at respective board exams.

### **Part tests**

To ensure that you remain totally in tune with class activities at all times, we conduct weekly 90-minute tests. These are based on what was taught in the past week itself. A score less than 65 in any of these 30-part tests imply that preparation at home requires more diligence. Feedback is regularly conveyed to each student

### **Mock Tests (or) Pre-Board tests**

These tests are modelled on the pattern of the respective board exams & competitive exams like IIT-JEE, AIEEE & BITSAT. Results of these model tests give you a very accurate picture of the real thing. Detailed subject-wise analysis is provided to every student, to enhance his or her performance.

### **Do you counsel students?**

Our core teams of teachers discharge the responsibility of counseling students. Counseling enhances the performance of students and gives them that extra edge. Our counselors play a vital role at different phases of a student's preparation. Systematic tracking of performances, re-strategizing and regular reviews empower the students to handle any test taking situation...

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## MODULES FOR CLASS XI / JUNIOR INTER STUDENTS

### PHYSICS MODULE – 1

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

➤ **Vectors**

**Classification of Physical Quantities** – Geometrical representation of vectors, Equality of Vectors, Addition of Vectors, Laws of Vector Addition, Subtraction of Vectors. **Resolution of a Vector into Components** – Null Vector or Zero Vector, Unit Vector : Unit Vector in Cartesian Coordinate System. **Parallelogram Law of Vector. Triangle Law and Polygon Law of Vectors. Concept of Relative Velocity** – Motion of a Boat in a River. **Multiplication of a Vector by a Scalar. Multiplication of Vectors. Scalar Product or Dot Product** – Properties of Scalar Product, Examples of Scalar Product. **Vector Product or Cross Product** – Properties of Vector Product, Examples of Vector Product

➤ **Kinematics**

**Motion in a Straight Line** – Displacement, Average Speed, Velocity, Uniform Motion, Non-Uniform Motion, Average velocity, Acceleration. Uniformly Accelerated Motion, Equation for Uniformly Accelerated Motion (Graphical Treatment), Acceleration due to Gravity, Equations of Motion for Freely Falling Body. **Equation of Motion of an Object Vertically Projected Upwards from the Ground** – Maximum Height, Time of Ascent ( $t_a$ ), Time of Descent ( $t_d$ ), Velocity of the Body on Reaching the Point of Projection, Vertical Projection of an object from a Tower. **Projectiles** – Time Taken to Reach Maximum Height, Time of Flight (T), Maximum Height Reached by the Projectile, Horizontal Range (R). **Velocity of the Projectile at any Instant 't'. Horizontal Projection from the Top of a Tower : Equation for Path (Trajectory)** - Time of Descent, Range

➤ **Dynamics**

**Newton's Laws of Motion. Applications of Newton's Laws** – Objects Suspend by Strings, Blocks Placed in Contact with each other on Frictionless Horizontal Surface, Apparent Weight in a Lift. Impulse (J), Law of Conservation of Momentum, Conservation of Linear Momentum During Collision. Work, Power, Energy, Kinetic Energy, Potential Energy, Relation between Kinetic Energy and Linear Momentum. Conservative and Non Conservative Forces, Work – Energy Theorem, Law of Conservation of Energy or Principle of Conservation of Energy, Law of Conservation of Energy in case of Freely Falling Body, Law of Conservation of Energy in case of Vertically Projected Body

➤ **Collisions**

**Elastic and Inelastic Collisions** – Elastic Collisions, Inelastic Collisions. **One Dimensional Elastic Collisions** – When the Two Bodies have Equal Mass ( $m_1 = m_2$ ), When a Smaller Body Collides with a Heavier body, When a Body Collides ( $m_1 \gg m_2$ ) with a Light Body at Rest ( $u = 0$ ), Perfectly Inelastic Collision, Definition of Coefficient of Restitution ( $e$ )

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➤ **Centre of Mass**

**Coordinates of Centre of Mass** – Centre of Mass of Particles Along a Line (1-dimensional), Centre of Mass of a System of Particles in (Two-Dimensional) Plane, Centre of Mass of a System of Particles in (Three Dimensions). Characteristics of Centre of Mass, Laws of Motion of the Centre of Mass, Velocity and Acceleration. **Explosion**

➤ **Friction**

**Causes of Friction** – Advantages of Friction, Disadvantages of Friction, Methods of Reducing Friction. **Types of Friction** – Static Friction, Dynamic Friction or Kinetic Friction, Rolling Friction, Distinction Between Static and Dynamic Friction. **Normal Reaction** – Laws of Friction, Laws of Friction – Static Friction, Laws of Friction – Kinetic Friction (or Dynamic Friction), Laws of Friction – Rolling Friction. **Angle of Friction ( $\phi$ )**–. Motion of a Body on Rough Horizontal Plane, Motion of Bodies on Inclines Plane. **Motion of a Body on Smooth Inclines Plane or Inclined Plane without Friction. Motion Along Rough Inclined Plane. Pushing and Pulling of a Lawn Roller**

➤ **Rotatory Motion**

**Angular displacement ( $\theta$ )**–. Angular velocity and angular acceleration, Relation between linear velocity and angular velocity, Uniform Circular Motion, Centripetal Acceleration, Centripetal and Centrifugal forces. **Moment of Inertia** – Parallel Axes Theorem, Perpendicular Axes Theorem. **Expression for Moment of Inertia of a Thin Rod** - Moment of Inertia of a Circular Ring, Moment of Inertia of Circular Disc, Moment of Inertia of Rectangular Lamina, Moment of Inertia of a Solid Sphere, Moment of Inertia of a Hollow Sphere, Moment of Inertia of Solid Cylinder, Moment of Inertia of a Hollow Cylinder. **Angular Momentum and its Conservation** – Relation Between Torque and Angular Momentum, Law of Conservation of Angular Momentum. **Motion in Vertical Circle**

➤ **Oscillation and Waves-Simple Harmonic Motion**

Periodic motion – 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 – derivation of expression for its time period; free and forced (damped) oscillations (qualitative ideas only), resonance. Wave motion. Longitudinal and transverse waves, speed of wave motion. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect. **Simple Harmonic Motion (SHM)** – Examples of Simple Harmonic Motion, Explanation of Simple Harmonic Motion By Reference Circle, Expression for Displacement, Velocity, Acceleration, Time period, Frequency, Phase and Epoch. **Simple Pendulum** – Expression for the time period of simple Pendulum. **Loaded Spring – Force Constant** – Expression for the time period of a loaded spring. **Potential Energy of Simple Harmonic Oscillator** – Total Energy of Simple Harmonic Oscillator, Law of Conservation of Energy in the case of a Simple Pendulum

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## PHYSICS MODULE – 2

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

### ➤ Gravitation

**Basic Forces in Nature. Nature of Gravity** – The Law of Universal Gravitation, Relation Between Universal Gravitational Constant (G) and Acceleration due to Gravity (g). **Variation of Acceleration due to Gravity (g)** – Variation of g with Altitude, Variation of g with Depth, Variation of g with Latitude, Variation of 'g' with Shape of the Earth, Characteristics of Gravitational Force. **Limitations of Newton's Third Law** – Gravitational Field, Gravitational Field Strength, Properties of Gravitational Field. **Black Holes** – Origin of Black Holes, Chandrasekhar Limit, Neutron Star. **Frames of Reference** – Inertial Reference Frame, Inertial Reference Frame, Inertial and Gravitational Mass, Principle of Equivalence. **Escape and Orbital Velocities** – Derivation of Relation between Escape Velocity and Orbital Velocity. **Geostationary Satellite** – Uses of Geostationary Satellites

### ➤ Properties of bulk Matter - Elasticity

Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity. Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes). Effect of gravity on fluid pressure. Viscosity, Stokes's law, terminal velocity, Reynold's number, streamline and turbulent flow. Bernoulli's theorem and its applications. Surface energy and surface tension, angle of contact, application of surface tension ideas to drops, bubbles and capillary action. Elasticity and Plasticity, Plasticity, Stress, Strain, Hooke's Law, Moduli of Elasticity. **Poisson's ratio** – Behaviour of a Metal Wire Under Increasing Load, Elastic Fatigue, Strain energy. **Experimental determination of Young's modulus (Y) – Searle's apparatus**

### ➤ Surface Tension

**Molecular Theory of Surface Tension** – Surface Tension Definition, Further Examples of Surface Tension, Surface Energy. **Angle of Contact** – Capillarity, Examples in Daily Life, Determination of Surface Tension by Capillary Rise Method. **Effect of Temperature of Surface Tension** – Excess of Pressure in Liquid Drop, Excess of Pressure in Soap Bubbles.

### ➤ Fluid Mechanics

**Pressure in a Fluid and Pressure Energy** – Principle of Buoyancy.

**Streamline Flow** – Bernoulli's Theorem, Applications, Illustrations of Bernoulli's Theorem.

**Viscosity** – Coefficient of Viscosity, Variation of Coefficient of viscosity with Temperature, Poiseuille's Equation, Motion of Objects in Fluids

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➤ **Temperature & Thermal Expansion**

**Concept of Temperature** - Measurement of Temperature, The Celsius scale, The Fahrenheit Scale, Relation between Celsius and Fahrenheit Scales, Different Types of Thermometers. **Expansion of Solids** – Vibration of Atoms in a Solid – P.E. Curve – Anharmonicity of Vibrations, Potential Energy Curve, Anharmonicity of Vibrations, Definition and Expression of Coefficient of Areal Expansion ( $\beta$ ), Definition and Expression of Coefficient of Cubical Expansion ( $\gamma$ ), Relation between the Coefficients. **Change of Density with Temperature** – Examples of Thermal Expansion of Solids in Daily Life. **Expansion of Liquids** – Coefficients of Real and Apparent, Relation between Coefficients of Real and Apparent expansion. **Experimental determination of Coefficient of Apparent Expansion of Liquid by Specific Gravity Bottle Method.** **Anomalous Expansion of Water** – Hope's experiment, Significance of Anomalous Expansion of Water in Nature, Pressure Coefficient of a Gas ( $\beta$ ), Relationship between  $\alpha$  and  $\beta$ . **Determination of Volume Coefficient : Regnault's Method.** **Determination of Pressure Coefficient : Jolly's Bulb Method.** **Kelvin Scale of Temperature** – Boyle's Law, Charles' Laws, Ideal Gas Equation, Derivation of Ideal Gas Equation

➤ **Thermodynamics**

**Quasi – Static Process** – Cyclic Process, Reversible Process. **Heat and temperature** – Zeroth law of thermodynamics – Calorie, Joule's law and Mechanical equivalent of heat, Internal energy, First law of thermodynamics. **Heat Capacity (H)** – Specific Heat, Determination of Specific Heat of a Solid by the method of mixtures. **Specific heats of a gas** – Work done by an ideal gas during expansion, Relation between  $C_p$  and  $C_v$ . **Isothermal Process** – Relations between P, V and T in an adiabatic process. **Work done in Isothermal Process** – Work done in an Adiabatic Process. **Heat Engines and Refrigerators.** **Three Phases of Matter** – Triple Point, Triple Point of Water. **Latent heat** – Determination of Latent Heat of Vaporisation of Water. **Second Law of Thermodynamics – Different Statements.** **Behaviour of Perfect Gas and Kinetic Theory.** Equation of state of a perfect gas, work done on compressing a gas. Kinetic theory of gases – assumptions, concept of pressure. Kinetic energy and temperature; rms speed of gas molecules; degrees of freedom, law of equipartition of energy (statement only) and application to specific heats of gases; concept of mean free path, Avogadro's number.

➤ **Transmission of Heat**

**Conduction of Heat** – Coefficient of Thermal Conductivity. **Types of Convection.** Thermal Radiation – Nature and Properties, Prevost's Theory of Heat Exchanges, Emissive Power (Emittance), Absorptive Power. Black body Radiation, Kirchhoff's law, Kirchhoff's Law : Applications, Stefan's Law. **Newton's law of cooling**

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## CHEMISTRY MODULE – 1

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

➤ **Atomic Structure**

Characteristics of electron, proton and neutron. Rutherford's model of an atom. Nature of Electromagnetic Radiation. Planck's Quantum Theory. Explanation of Photo electric Effect. Features of atomic spectra. Characteristics of hydrogen spectrum. Bohr's explanation of spectral lines. Failure of Bohr's theory. Wave-particle nature of electrons. De Broglie's hypothesis, Heisenberg's uncertainty principle. Important features of the Quantum Mechanical Model of an atom. Quantum numbers, Concept of orbitals, Define an atomic orbital in terms of quantum numbers – shapes of s, p and d orbitals, State Aufbau principle, Pauli's exclusion principle and Hund's rule of maximum multiplicity. Electronic configurations of Atoms.

➤ **Chemical Bonding and Molecular Structure**

Kossels Lewis approach to chemical bonding. Factors favourable for the formation of ionic bond; Energy changes in ionic bond formation. Crystal lattice energy – calculation lattice energy- Born – Haber cycle. Crystal structure of sodium chloride and Caesium chloride. Properties of ionic compounds. Covalent bond- VSEPR theory and prediction the geometry of simple molecules. The valence bond approach for the formation of covalent bonds. Directional properties of covalent bond. Properties of covalent bond. Hybridization of orbitals and shapes of molecules. Definition of coordinate covalent bond with examples. Description of molecular orbitals theory of homonuclear diatomic molecules. Bonding, Antibonding molecular orbitals,  $\sigma$ ,  $\pi$  bond orbitals their symmetry. Energy diagrams molecular orbitals of  $H_2$ ,  $N_2$  and  $O_2$ . Concept of hydrogen bond – Types of hydrogen bonds, inter and intra molecular hydrogen bonds. Effects of H – bonds on some properties of substances with examples. Different states of matter in terms of balance between intermolecular forces, thermal energy of particles.

➤ **States of Matter (Gases and Liquids)**

Graham's Law of diffusion, Dalton's Law of partial Pressure and Avogadro's Law. Ideal behaviour, empirical derivation of gas equation, ideal gas equation. Kinetic molecular theory of gases. Kinetic gas equation – Deduction of gas laws from kinetic gas equation. Distribution of molecular velocities and types of molecular velocities. Behaviour of real gases, deviation from ideal behaviour, compressibility factor Vs pressure – diagrams of real gases. Conditions of liquefaction of gases, critical temperature. Liquid state – properties of liquid in terms of intermolecular attractions. Vapour pressure, viscosity and surface tension

➤ **Some basic principles of Chemistry & Stoichiometry**

Laws of chemical combination principle and examples. Molar mass, concept of equivalent weights with examples. Percentage composition of compounds and calculations of empirical and molecular formulae of compounds. Chemical reactions and equations. Oxidation Number Concept. Balancing of redox reactions by ion electron method and oxidation number method. Types of redox reactions. Applications of redox reactions in titrimetric quantitative analysis and redox reactions in electrode process. Numerical calculations based on equations.

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➤ **p-Block elements (Group 13 elements)**

General introduction, electronic configuration, occurrence. Variation of properties, oxidation states, trends in chemical reactivity. Anomalous properties of first element of the group.

Boron – Physical and chemical properties and uses. Some important compounds : Borax ; Boric acids; Boron hydrogen. Aluminium : Uses, reactions with acids and alkalies. Potashalum

➤ **Group 14 Elements (IVA Group elements)**

General introduction, Electronic configuration, Occurrence. Variations of properties, oxidation states, trends in chemical reactivity. Anomalous behaviour of the first element.

Carbon – catenation, Allotropic forms, Physical and Chemical properties and uses; Similarities between Carbon and Silicon, uses of oxides of carbon. Important compounds of Silicon, Silicon dioxide and a few uses of Silicon tetrachloride, Silicones, Silicates and zeolites (Elementary ideas). Fuel gases – Producer gas and Water gas manufacture and uses. Compounds of Xenon oxides and halides (structures only)

➤ **Environmental chemistry**

Definition of terms : Air, water and soil pollutions. Oxides of carbon, Carbon monoxide, CO. Oxides of nitrogen and sulphur and chlorofluoro carbons. Chemical reactions in atmosphere, smogs, major atmospheric pollutants and acid rain. Ozone and its reactions, effects of depletion of ozone layer. Green house effect and Global warming. Pollution due to industrial wastes. Green chemistry as an alternative tool for reducing pollution with examples

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## CHEMISTRY MODULE – 2

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

➤ **Classification of Elements and Periodicity in properties**

The concept of grouping elements in accordance to their properties. The Periodic Law-Mendeleev's classification of elements. Significance of atomic number and electronic configuration as the basis for periodic classification. Classification of elements into s, p, d, f – blocks and their main characteristics. Periodic trends in physical and chemical properties of elements. Periodic trends of elements with respect to Atomic Radii, Ionic Radii, inert gas Radii, Ionization Energy, Electron Gain Energy, Electro Negativity. Variation of atomic radii in inner transition elements.

➤ **Hydrogen and its Compounds**

Position of Hydrogen in Periodic table. Occurrence, Isotopes of hydrogen. Hydrogen preparation, properties and uses including as a fuel. Reaction of hydrogen with different types of elements leading to ionic, molecular and non-stoichiometric hydrides. Physical and Chemical properties of water and heavy water. Hydrogen peroxide – preparation methods, physical and chemical properties – oxidation, reduction – decomposition – disproportionation and addition reactions. Detection of hydrogen peroxide. Structure of  $H_2O_2$ , uses of  $H_2O_2$ .

➤ **Alkali and Alkaline Earth metals**

General introduction, Electronic Configuration, Occurrence. Anomalous properties of the first element in each group. Diagonal relationship. Trends in properties like ionization enthalpy, atomic and ionic radii, reactivity with  $O_2$ ,  $H_2$ ,  $X_2$  and water, uses. Preparation and properties of some important compounds : Sodium hydroxide, salts of oxo acids : Sodium carbonate and Sodium hydrogen carbonate : Sodium Chloride. Biological importance of sodium and potassium. Electronic configuration of Alkaline earth metals. Industrial use of lime and lime stone. Biological importance of Mg and Ca. Fuel gases – Producer gas and Water gas manufacture and uses

➤ **Group 18 Elements (Zero group elements)**

General introduction, Electronic Configuration, Occurrence, Isolation. Trends in physical and chemical properties; uses. Compounds of Xenon oxides and halides (structures only)

➤ **Organic Chemistry – Some basic principles and techniques**

General introduction, Methods of purification, Qualitative and Quantitative Analysis. Classification and IUPAC Nomenclature of Organic Compounds. Electronic displacements in a covalent bond : Inductive effect, Electromeric effect; Resonance and Hyperconjugation. Fission of a covalent bond : Homolytic and Heterolytic fissions. Types of reagents Electrophiles, Nucleophiles and free radicals – examples reactive intermediates. Common types of organic reactions – Substitution, Addition, Elimination and Rearrangement reactions with examples.

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➤ **Hydrocarbons**

Classification of hydrocarbons. Alkanes – Nomenclature, isomerism, conformations. Methods of preparation of ethane. Physical properties, chemical reactions including free radical mechanism of Halogenation, combustion and Pyrolysis of Ethane. Cycloalkanes, preparation and properties of cyclohexane. Alkenes – Nomenclature, structure of double bond (Ethene), Geometrical isomerism, physical properties. Methods of preparation of ethylene. Physical properties, chemical reactions : Addition of hydrogen, halogen, water, Hydrogen halides (Markownikoff's addition and Peroxide Effect), Ozonolysis, Oxidation, Mechanism of Electrophilic addition. Alkynes – Nomenclature, Structure of triple bond, Methods of preparation of acetylene. Physical properties, Chemical reactions : Acidic character of acetylene, addition reaction of hydrogens, halogens, hydrogen halides and water to acetylene. Aromatic Hydrocarbons : Introduction, IUPAC nomenclature; Benzene; Resonance, Aromaticity. Chemical properties : Mechanism of electrophilic substitution – Nitration, Sulphonation, Halogenation, Friedel Craft's alkylation and acylation; directive influence of functional group in mono-substituted benzenes; carcinogenicity and Toxicity. Stereochemistry : Introduction of Isomerism and recapitulation of Geometrical Isomerism and Conformations. Optical activity – Discovery, Determination using a Polarimeter, Specific rotation, Chirality – Chiral objects, Chiral molecules. Configuration and Fischer projections. Asymmetric carbon, elements of symmetry. Compound containing one chiral center, enantiomers. Racemic forms, Racemization R-S and D-L nomenclature. Compounds containing two Chiral centers, Diastereoisomers, Mesoform, Resolution, Importance of Stereochemistry.

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## MATHEMATICS MODULES FOR JUNIOR INTER STUDENTS

### MODULE – 1

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

➤ **Trigonometric Ratios and Transformations**

Trigonometric ratios – Variation –Graphs and Periodicity. Trigonometric ratios of compound angles. Trigonometric ratios of multiple and sub-multiple angles. Sum and product transformations

➤ **Trigonometric Equations**

General solutions of trigonometric equations. Simple trigonometric equations –solutions

➤ **Inverse Trigonometric Functions**

To reduce a trigonometric function into a bijective function. Graphs of Inverse trigonometric functions. Properties of inverse trigonometric functions

➤ **Hyperbolic functions**

Hyperbolic functions. Inverse hyperbolic functions. Properties of Hyperbolic functions. Inverse hyperbolic functions in terms of logarithmic functions

➤ **Properties of Triangles**

Relation between the sides and angles of a triangle. Sine, Cosine and Tangent Rules –Projection Rules . Half angle formulae and area of a triangle. Incircle and excircles of a triangle

➤ **Heights and Distances**

Angle of elevation and angle of depression

➤ **Complex Numbers**

Complex number as an ordered pair of real numbers –Fundamental operations. Representation of complex numbers in the form  $a + ib$  Real and imaginary parts. Conjugate of a complex number. Modulus and amplitude of a complex number. Geometrical representation of a complex number ; Argand plane –Argand diagram

➤ **De Moivre's Theorem**

De Moivre' s Theorem for integral index and for rational index.  $n^{\text{th}}$  roots of unity – Geometrical representation. Cube roots of unity

➤ **Trigonometric Expansions**

Expansion of Trigonometric functions sin

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## MODULE – 2

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

### Algebra

➤ **Functions**

Ordered pairs , Functions. Inverse Functions. Real valued function.

➤ **Mathematical Induction**

Principles of mathematical induction. Applications of mathematical induction. Problems on divisibility

### Vector Algebra

➤ **Addition and Scalar Multiplication of Vectors**

Basic Concepts. Vector as a triad of real numbers. Classification of Vectors. Addition of vectors. Multiplication of a vector by a scalar. Angle between two non –zero vectors. Linear Combination of Vectors. Components of a vector in Three Dimensions. Vector Equations of Line and Plane

➤ **Multiplication of Vectors**

Scalar or dot product of two vectors – Geometrical interpretation. Orthogonal projection Properties of Dot product. Expression for scalar (dot) product in terms of  $i, j, k$  . Some geometrical and trigonometrical theorems -. Through vector methods (applications ). Vector equation of a plane – normal form. Vector equation of a sphere and angle between two planes. Vector product (Cross product) of two vectors and properties. Vector product in  $(i, j, k)$  system. Vector Area. Scalar Triple product. Vector equation of a plane in different forms, skew lines, Shortest distance between two skew lines. Vector triple product –some results. Scalar and Vector products of four vectors

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## MODULE – 3

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

### Coordinate Geometry

➤ **Prerequisites**

Prerequisites

➤ **Locus**

Defination of Locus. Equation of Locus

➤ **Transformation of Axes**

Translation of axes. Rotation of axes

➤ **Straight Line**

Revision of fundamental results. Equation of a straight line in normal form. Equation of a straight line in symmetric form. Reduction of the equation of a straight line into various forms. Intersection of two straight lines and half – planes. Family of straight lines – Concurrent straight lines. Conduction for concurrency of three straight lines. Angle between two lines. Length of the perpendicular from a point to a straight line and distance between two parallel lines. Concurrent lines – Properties related to a triangle

➤ **Pair of straight lines**

Equation of a pair of lines passing through the origin. Angle between 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 the pair of lines. Homogenising a second degree equation with a first degree equation in x and y

➤ **Three Dimensional Coordinates**

Coordinates. Section formula

➤ **Direction Cosines and Direction Ratios**

Direction cosines. Direction ratios

➤ **The Plane**

Cartesian equation of a plane – simple illustrations

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## MODULE – 4

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

### Calculus

➤ **Functions, Limits and Continuity**

Functions and Graphs. Intervals and neighbourhoods. Limits. Certain standard limits. Continuity

➤ **Differentiation**

Derivative of a function. Elementary properties of derivatives. The derivatives of trigonometric, inverse trigonometric, hyperbolic and inverse hyperbolic functions. Special methods of differentiation. Second Order Derivatives

➤ **Applications of Differentiation**

Errors and Approximations. Geometrical interpretation of the derivative. Equations of tangent and normal to a curve. Lengths of tangent, normal, subtangent and subnormal. Angle between two curves and orthogonality. Derivative as rate of change. Increasing and decreasing functions. Maxima and Minima

➤ **Partial differentiation**

Partial derivatives – First and second orders. Homogeneous functions

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## MATHEMATICS MODULES FOR CBSE CLASS XI STUDENTS

### MODULE – 1

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

➤ **Sets**

Sets and their representations. Empty set. Finite & Infinite sets. Equal sets, Subsets. Subjects of the 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.

➤ **Relation & Functions**

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

➤ **Trigonometric Function**

Positive and negative angles. Measuring angles in radians & in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Truth of the identity

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## MODULE – 2

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### ALGEBRA

➤ **Principle of Mathematical Induction**

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

➤ **Complex Numbers and Quadratic Equations**

Need for complex numbers, especially  $\sqrt{-1}$ , to be motivated by inability to solve every quadratic equation. Brief description of algebraic properties of complex number. Argand plane and polar representation of complex number. Statement of Fundamental Theorem Algebra, solution of quadratic equation in the complex number system

➤ **Linear Inequalities**

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

➤ **Permutations & Combinations**

Fundamental principle of counting. Factorial  $n$ .  $(n!)$  Permutations and combinations, derivation of formulae and their connections, simple applications.

➤ **Binomial Theorem**

History, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, General and middle term in binomial expansion, simple applications.

➤ **Sequence and Series**

Sequence and Series. Arithmetic progression (A.P.). arithmetic mean (A.M.) Geometric progression (G.P.), general term of a G.P., sum of  $n$  terms of a G.P. geometric mean (G.M), relation between A.M and G.M. Sum to  $n$  terms of the special series  $n$ ,  $n^2$  and  $n^3$ .

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## MODULE – 3

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

### **Coordinate Geometry**

#### ➤ **Straight Lines**

Brief recall of 2D from earlier classes. Slope of a line and angle between two lines. Various forms of equations of line: parallel to axes, point-slope form, slope-intercept form, two-point form, intercepts form and normal form. General equation of a line. Distance of a point from a line.

#### ➤ **Conic Section**

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

#### ➤ **Introduction to Three dimensional Geometry**

Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points and section formula.

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## MODULE – 4

**Learn what you need - If you have not followed the following topics at your school / college, we extend the flexibility to enrol for this module comprising 35 hours (Fee : Rs.5,000)**

### Calculus

#### ➤ Limits and Derivatives

Derivative introduced as rate of change both as that of distance function and geometrically, intuitive idea of limit. 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.

#### ➤ Mathematical Reasoning

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

### Statistics & Probability

#### ➤ Statistics

Measure of dispersion: mean deviation, variance and standard deviation of ungrouped/grouped data. Analysis of frequency distributions with equal means by different variances.

#### ➤ 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 the theories of earlier classes. Probability of an event, probability of 'not', 'and' & 'or' events.



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