



## SYLLABUS FOR THE तीव्र तीस SCHOLARSHIP ENTRANCE TEST

### SYLLABUS-SCIENCE PORTION

[50 MARKS]

<b>PHYSICS</b>	<p><b>Chapter: Light – Reflection and Refraction</b> Reflection of light by curved surfaces; Images formed by spherical mirrors, centre of curvature, principal axis, principal focus, focal length, mirror formula (Derivation not required), magnification. Refraction; Laws of refraction, refractive index. Refraction of light by spherical lens; Image formed by spherical lenses; Lens formula (Derivation not required); Magnification. Power of a lens. Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life.</p> <p><b>Chapter Electricity</b> Ohm’s law; Resistance, Resistivity, Factors on which the resistance of a conductor depends. Series combination of resistors, parallel combination of resistors and its applications in daily life. Heating effect of electric current and its applications in daily life. Electric power, Interrelation between P, V, I and R.</p> <p><b>Chapter : Magnetic effects of current</b> Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming’s Left Hand Rule, Electric Motor, Electromagnetic induction. Induced potential difference, Induced current. Fleming’s Right Hand Rule.</p>
<b>CHEMISTRY</b>	<p><b>Chapter: Chemical reactions and equations</b> Chemical equation, Balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.</p> <p><b>Chapter –Acids, Bases and Salts</b> Their definitions in terms of furnishing of H<sup>+</sup> and OH<sup>-</sup> ions, General properties, examples and uses, concept of pH scale (Definition relating to logarithm not required), importance of pH in everyday life; preparation and uses of Sodium Hydroxide, Bleaching powder, Baking soda, Washing soda and Plaster of Paris.</p> <p><b>Chapter Carbon and its compounds</b> Covalent bonding in carbon compounds. Versatile nature of carbon, Homologous series, Saturated and Unsaturated Hydrocarbons. Basic Preparation and Properties(both Physical and Chemical)of Ethane, Ethene, Ethyne, Ethanoic Acid and Ethanol.</p> <p><b>Chapter: Periodic classification of elements</b> Need for classification, early attempts at classification of elements (Dobereiner’s</p>

	Triads, Newland's Law of Octaves, Mendeleev's Periodic Table), Modern periodic table, gradation in properties, valency, atomic number, metallic and non-metallic properties. Properties of metals and non-metals; Reactivity series; Formation and properties of ionic compounds.
<b>BIOLOGY</b>	<p><b>Control and co-ordination in animals and plants:</b> Tropic movements in plants; Introduction of plant hormones; Control and co-ordination in animals: Nervous system; Voluntary, involuntary and reflex action; Chemical co-ordination: animal hormones.</p> <p><b>Reproduction:</b> Reproduction in animals and plants (asexual and sexual) reproductive health – need and methods of family planning. Safe sex vs HIV/AIDS. Child bearing and women's health.</p> <p><b>(i) Cell Cycle and Cell Division:</b> Cell Cycle – Interphase (G1, S, G2) and Mitotic Phase Cell Division: Mitosis and its stages. A basic understanding of Meiosis as a reduction division (stages not required). A brief idea of homologous chromosomes and crossing over leading to variations. Significance and major differences between mitotic and meiotic division.</p> <p><b>(ii) Structure of chromosome:</b> Basic structure of chromosome with elementary understanding of terms such as chromatin, chromatid, gene structure of DNA and centromere.</p> <p><b>(iii) Genetics: Mendel's laws of inheritance.</b> The three laws of Mendel. Monohybrid cross – phenotype and genotype. Mendel's experiments on inheritance taking 7 pairs of contrasting features of garden pea. The following terms to be covered: gene, allele, heterozygous, homozygous, dominant, recessive, mutation, variation, phenotype, genotype, homologous chromosomes, autosomes, sex chromosomes.</p> <p><b>3. Human Anatomy and Physiology</b></p> <p><b>(i) Circulatory System:</b> Blood and lymph, the structure and working of the heart, blood vessels, circulation of blood (only names of the main blood vessels entering and leaving the heart, liver and kidney will be required). Lymphatic system.</p> <p><b>(ii) Excretory System:</b> A brief introduction to the excretory organs; parts of the urinary system; structure and function of the kidneys; blood vessels associated with kidneys; structure and function of nephron.</p> <p><b>(iii) Nervous system:</b> Structure of Neuron; central, autonomous and peripheral nervous system (in brief); brain and spinal cord; reflex action and how it differs from voluntary action. Sense organs – Eye: Structure, functions, defects and corrective measures: Ear: Parts and functions of the ear.</p> <p><b>Heredity and Evolution:</b> Heredity; Mendel's contribution- Laws for inheritance of traits: Sex determination: brief introduction: (topics excluded - evolution; evolution and classification and evolution should not be equated with progress)</p> <p><b>Our environment:</b> Eco-system, Environmental problems, Ozone depletion, waste production and their solutions. Biodegradable and non-biodegradable substances</p>
<b>SYLLABUS-MATHS PORTION [50 MARKS]</b>	
	<p><b>QUADRATIC EQUATIONS (IN ONE VARIABLE ONLY)</b></p> <p>(a) Nature of roots</p> <ul style="list-style-type: none"> <li>• Two distinct real roots if <math>b^2 - 4ac &gt; 0</math></li> </ul>

• Two equal real roots if  $b^2 - 4ac = 0$

• No real roots if  $b^2 - 4ac < 0$

(b) Solving Quadratic equations by:

• Factorisation

• Using Formula.

(c) Solving simple quadratic equation word problems

### **ARITHMETIC PROGRESSIONS**

• Finding General term.

• Finding Sum of first 'n' terms.

### **TRIANGLES**

Similarity, conditions of similar triangles.

(i) Comparison with congruency, keyword being proportionality.

(ii) Three conditions: SSS, SAS, AA. Simple applications (proof not included).

### **CO-ORDINATE GEOMETRY**

Distance formula, Section formula ((Internal section only), Mid-point formula, co-ordinates of the centroid of a triangle

### **INTRODUCTION TO TRIGONOMETRY**

Using Identities to solve/prove simple algebraic trigonometric expressions

$$\sin^2 A + \cos^2 A = 1$$

$$1 + \tan^2 A = \sec^2 A$$

$$1 + \cot^2 A = \operatorname{cosec}^2 A; 0 \leq A \leq 90^\circ$$

### **SOME APPLICATIONS ON TRIGONOMETRY**

Heights and distances:

Solving 2-D problems involving angles of elevation and depression using trigonometric tables

### **CIRCLES (TANGENTS ONLY)**

Tangent and Secant Properties:

• The tangent at any point of a circle and the radius through the point are perpendicular to each other.

• If two circles touch, the point of contact lies on the straight line joining their centres.

• From any point outside a circle, two tangents can be drawn, and they are equal in length.

• If two chords intersect internally or externally then the product of the lengths of the segments are equal.

### **SURFACE AREAS AND VOLUMES**

Area and volume of solids – Cylinder and Cone.

Three-dimensional solids - right circular cylinder and right circular cone: Area (total surface and curved surface) and Volume. Direct application problems including cost, Inner and Outer volume and melting and recasting method to find the volume or surface area of a new solid. Combination of solids included

**STATISTICS**

Computation of:

- Measures of Central Tendency: Mean\*, median class and modal class for continuous grouped data.

Graphical Representation. Histograms and Less than Ogive.

- Finding the mode from the histogram and median etc. from the ogive.

**PROBABILITY**

Random experiments, Sample space, Events, definition of probability, Simple problems on single events

**THEMATIC APPERCEPTION ANALYSIS:****[50 MARKS]**

Comprehension and analysis of pictures, situations, stories and events.

Verbal, Non Verbal and Numerical Analysis.

**ENGLISH:****[50 MARKS]**

**Writing skill Section:** Article writing, Short Essay writing etc.

**Application Based Topics** from the Grammar portion related to syllabus.