

SPARK ENGG SYLLABUS

Subject-wise topics at a glance

PHYSICS

CHEMISTRY

MATHEMATICS

01 PHYSICS

Motion	Distance and displacement, velocity; uniform and non-uniform motion along a straight line; acceleration, distance-time and velocity-time graphs for uniform motion and non-uniform motion with constant and variable acceleration. Equations of kinematics.
Force and Newton's Laws	Force and motion, Newton's laws of motion, action and reaction forces, inertia of a body, inertia and mass, momentum, force and acceleration. Conservation of linear momentum.
Gravitation	Universal law of gravitation, force of gravitation of the earth (gravity), acceleration due to gravity; mass and weight; free fall.
Work, Energy and Power	Work done by a force, energy, power; kinetic and potential energy; law of conservation of energy.
Optics	Reflection of light by curved surfaces; images formed by spherical mirrors, centre of curvature, principal axis, principal focus, focal length, mirror formula, magnification. Refraction; laws of refraction, refractive index. Refraction of light by spherical lens; image formed by spherical lenses; lens formula; magnification. Power of a lens. Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life.
Effects of Current	Electric current, potential difference and electric current. 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.
Magnetic Effects of Current	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.

02 CHEMISTRY

Matter	• Compounds • Mixtures • Colloids and suspensions
Atoms and Molecules	• Laws of chemical combinations • Mole concept and calculations based on it • Atomic mass & molecular mass • Chemical formula of common compounds and valency
Structure of Atom	• Electron, proton & neutron • Atomic models (Rutherford's model and Bohr's model) • Atomic number and mass number • Isotopes, isobars and isotones
Chemical Reactions	Types of chemical reactions (combination, decomposition, displacement, double displacement, neutralisation, oxidation & reduction).
Acids, Bases and Salts	• Indicators for testing acids & bases • Properties of acids & bases • pH and pH scale • Preparation and properties of salts like common salt, washing soda, baking soda, bleaching powder, plaster of Paris • Classification of salts • Hydrated salts
Carbon and its Compounds	• Homologous series • Nomenclature of organic compounds • Saturated and unsaturated hydrocarbons • Chemical properties of carbon compounds (combustion, oxidation, addition and substitution reactions)

03 MATHEMATICS

Real Numbers	- Representation of terminating and non-terminating decimals on the number line - Rationalisation of real numbers of the forms $1 / (a + b\sqrt{x})$ and $1 / (\sqrt{x} + \sqrt{y})$
Algebra	Basic problems on polynomials like quadratic and cubic polynomials & nature of roots, remainder theorem.
Co-ordinate Geometry	Application of distance formula, section formula, mid-point formula, centroid, circumcentre, incentre, angle between two lines, application of slope of a line.
Triangles	Nature of triangles, properties and theorems.
Trigonometry	Basic trigonometry on tables, fundamental formulae, application of trigonometry (height and distance).
Probability	Simple problems on single events and double events.
Statistics	Problems on mean, median, mode and properties.
Arithmetic Progression	Problems on term and sum of an AP; problems on nth term and sum of n terms of an AP.
Mensuration	Area & volume of different shapes.
Arithmetic	Problems on simple interest, period and time.