Kothari international School, Noida
A LEVEL
Annual Curriculum Overview for the Session 2024-2025

SUBJECT – ENGLISH GENERAL

TOPIC/UNIT	CONTENT
Revision Paper 1 - Essay	• Command Words • Opinion, Examples, Evidence • Organisation and Structure • Discursive Essay
Revision Paper 1 - Essay Discursive Essay	• Concluding discursive- briefly revisiting the various interim conclusions drawn, picking a side now that all evidence has been carefully considered, considering implications of a course of action, considering limitations of proposed solutions and suggesting further research.
Revision Paper 2 - Comprehension	• Identify, select, and interpret information • Prose • Logical Reasoning

SUBJECT – BIOLOGY

TOPIC/UNIT	CONTENT
UNIT-1 Energy and Respiration	12.1 The need for energy in living organisms 12.2 Aerobic respiration 12.3 Mitochondrial structure and function 12.4 Respiration without oxygen 12.5 Respiratory substrates

UNIT-2 Photosynthesis	13.1 An energy transfer process 13.2 Structure and function of chloroplasts 13.3 The light-dependent stage of photosynthesis 13.4 The light-independent stage of photosynthesis 13.5 Limiting factors in photosynthesis
UNIT-3 Homeostasis	14.1 Homeostasis 14.2 The structure of the kidney 14.3 Control of water content 14.4 The control of blood glucose 14.5 Homeostasis in plants
UNIT-4 Control and coordination	15.1 Hormonal communication 15.2 Nervous communication 15.3 Muscle contraction 15.4 Control and coordination in plants
UNIT-5 Inheritance	16.1 Gametes and reproduction 16.2 The production of genetic variation 16.3 Genetics 16.4 Monohybrid inheritance and genetic diagrams 16.5 Dihybrid inheritance 16.6 The chi-squared ($\chi 2$) test 16.7 Genes, proteins and phenotype 16.8 Control of gene expression
UNIT-6 Selection and evolution	17.1 Variation 17.2 Natural selection 17.3 Genetic drift and the founder effect 17.4 The Hardy–Weinberg principle 17.5 Artificial selection 17.6 Evolution 17.7 Identifying evolutionary relationships
UNIT-7 Classification, biodiversity and conservation	18.1 Classification 18.2 Biodiversity 18.3 Maintaining biodiversity 18.4 Protecting endangered species 18.5 Controlling alien species 18.6 International conservation organizations

UNIT-8 Genetic technology	19.1 Genetic engineering 19.2 Tools for the gene technologist 19.3 Gene editing 19.4 Separating and amplifying DNA 19.5 Analysing and storing genetic information 19.6 Genetic technology and medicine 19.7 Genetic technology and agriculture

SUBJECT – PHYSICS

TOPIC/UNIT	CONTENT
Electric Current	• Understand that an electric current is a flow of charge carriers. • Understand that the charge-on-charge carriers is quantized. • Recall and use $Q = It$. • Use, for a current-carrying conductor, the expression $I = Anvq$, where n is the number density of charge carriers.
Potential difference and power	• Define the potential difference across a component as the energy transferred per unit charge. • Recall and use $V = W / Q$. • Recall and use $P = VI$, $P = I^2 R$ and $P = V^2 / R$.
Practical circuits	• Recall and use the circuit symbols shown in the syllabus. • Draw and interpret circuit diagrams. • Define and use the electromotive force (e.m.f.) of a source as energy transferred per unit charge in driving charge around a complete circuit. • Distinguish between e.m.f. and potential difference (p.d.) in terms of energy considerations. • Understand the effects of the internal resistance of a source of e.m.f. on the terminal potential difference.

Kinematics of uniform circular motion Centripetal acceleration	• Define the radian and express angular displacement in radians. • Understand and use the concept of angular speed. • Recall and use $\omega = 2\pi/T$ and $v = r\omega$. • Understand that a force of constant magnitude that is always perpendicular to the direction of motion causes centripetal acceleration. • Understand that centripetal acceleration causes circular motion with a constant angular speed. • Recall and use $a = r\omega^2$ and $a = v^2 / r$. • Recall and use $F = mr\omega^2$ and $F = mv^2 / r$
Gravitational force between point masses Gravitational field of a point mass Gravitational potential	• Understand that a gravitational field is an example of a field of force and define gravitational field as force per unit mass. • Represent a gravitational field by means of field lines. • Understand that, for a point outside a uniform sphere, the mass of the sphere may be considered to be a point mass at its centre. • Recall and use Newton's law of gravitation $F = Gm_1m_2 / r^2$ for the force between two point masses. • Analyse circular orbits in gravitational fields by relating the gravitational force to the centripetal acceleration it causes. • Understand that a satellite in a geostationary orbit remains at the same point above the Earth's surface, with an orbital period of 24 hours, orbiting from west to east, directly above the Equator. • Derive, from Newton's law of gravitation and the definition of gravitational field, the equation $g = GM / r^2$ for the gravitational field strength due to a point mass. • Recall and use $g = GM / r^2$. • Understand why g is approximately constant for small changes in height near the Earth's surface. • Define gravitational potential at a point as the work done per unit mass in bringing a small test mass from infinity to the point. • Use $\phi = -GM / r$ for the gravitational potential in

	the field due to a point mass. • Understand how the concept of gravitational potential leads to the gravitational potential energy of two point masses and use $E_P = -GMm / r$.
Thermal equilibrium Temperature scales Specific heat capacity and specific latent heat The mole Equation of state The mole Equation of state Internal energy The first law of thermodynamics	• Understand that (thermal) energy is transferred from a region of higher temperature to a region of lower temperature. • Understand that regions of equal temperature are in thermal equilibrium. • Understand that a physical property that varies with temperature may be used for the measurement of temperature and state examples of such properties. • Understand that the scale of thermodynamic temperature does not depend on the property of any particular substance. • Convert temperatures between kelvin and degrees Celsius and recall that $T / K = \theta / °C + 273.15$. • Understand that the lowest possible temperature is zero kelvin on the thermodynamic temperature scale and that this is known as absolute zero. • Define and use specific heat capacity. • Define and use specific latent heat and distinguish between specific latent heat of fusion and specific latent heat of vaporisation. • Understand that amount of substance is an SI base quantity with the base unit mol. • Use molar quantities where one mole of any substance is the amount containing a number of particles of that substance equal to the Avogadro constant N_A. • Understand that a gas obeying $pV \propto T$, where T is the thermodynamic temperature, is known as an ideal gas. • Recall and use the equation of state for an ideal gas expressed as $pV = nRT$, where n = amount of substance (number of moles) and as $pV = NkT$, where N = number of molecules. • Recall that the Boltzmann constant k is given by $k = R / N_A$. • State the basic assumptions of the kinetic theory of gases.

	• Explain how molecular movement causes the pressure exerted by a gas and derive and use the relationship $pV = 1/3Nm\langle c^2\rangle$, where $\langle c^2\rangle$ is the mean-square speed. • Understand that the root-mean-square speed $c_{r.m.s.}$ is given by $\langle c^2\rangle$. • Compare $pV = 1/3Nm\langle c^2\rangle$ with $pV = NkT$ to deduce that the average translational kinetic energy of a molecule is $3/2\ kT$. • Understand that internal energy is determined by the state of the system and that it can be expressed as the sum of a random distribution of kinetic and potential energies associated with the molecules of a system. • Recall and use $W = p\Delta V$ for the work done when the volume of a gas changes at constant pressure and understand the difference between the work done by the gas and the work done on the gas. • Recall and use the first law of thermodynamics $\Delta U = q + W$ expressed in terms of the increase in internal energy, the heating of the system (energy transferred to the system by heating) and the work done on the system.
Simple harmonic oscillations Energy in simple harmonic motion Damped and forced oscillations, resonance	• Understand and use the terms displacement, amplitude, period, frequency, angular frequency and phase difference in the context of oscillations, and express the period in terms of both frequency and angular frequency. • Understand that simple harmonic motion occurs when acceleration is proportional to displacement from a fixed point and in the opposite direction. • Use $a = -\omega^2 x$ and recall and use, as a solution to this equation, $x = x_0 \sin \omega t$. • Use the equations $v = v_0 \cos \omega t$ and $v = \pm \omega (x_0^2 - x^2)$. • Analyse and interpret graphical representations of the variations of displacement, velocity and acceleration for simple harmonic motion. • Describe the interchange between kinetic and potential energy during simple harmonic motion. • Recall and use $E = \frac{1}{2}m\omega^2 x_0^2$ for the total energy of a system undergoing simple harmonic motion. • Understand that a resistive force acting on an oscillating system causes damping. • Understand and use the terms light, critical and heavy damping and sketch displacement–time graphs illustrating these types of damping.

	• Understand that resonance involves a maximum amplitude of oscillations and that this occurs when an oscillating system is forced to oscillate at its natural frequency.
Electric fields and field lines Uniform electric fields Electric force between point charges Electric field of a point charge Electric potential	• Understand that an electric field is an example of a field of force and define electric field as force per unit positive charge. • Recall and use $F = qE$ for the force on a charge in an electric field. • Represent an electric field by means of field lines. • Recall and use $E = \Delta V / \Delta d$ to calculate the field strength of the uniform field between charged parallel plates. • Describe the effect of a uniform electric field on the motion of charged particles. • Understand that, for a point outside a spherical conductor, the charge on the sphere may be considered to be a point charge at its centre. • Recall and use Coulomb's law $F = Q_1Q_2 / (4\pi\varepsilon_0 r^2)$ for the force between two point charges in free space. • Recall and use $E = Q / (4\pi\varepsilon_0 r^2)$ for the electric field strength due to a point charge in free space. • Define electric potential at a point as the work done per unit positive charge in bringing a small test charge from infinity to the point. • Recall and use the fact that the electric field at a point is equal to the negative of potential gradient at that point. • Use $V = Q / (4\pi\varepsilon_0 r)$ for the electric potential in the field due to a point charge. • Understand how the concept of electric potential leads to the electric potential energy of two-point charges and use $E_P = Qq / (4\pi\varepsilon_0 r)$.
Capacitors and capacitance Energy stored in a capacitor Discharging a capacitor	• Define capacitance, as applied to both isolated spherical conductors and to parallel plate capacitors. • Recall and use $C = Q / V$. • Derive, using $C = Q / V$, formulae for the combined capacitance of capacitors in series and in parallel. • Use the capacitance formulae for capacitors in series and in parallel.

	• Determine the electric potential energy stored in a capacitor from the area under the potential–charge graph. • Recall and use $W = ½QV = ½CV^2$ • Analyse graphs of the variation with time of potential difference, charge and current for a capacitor discharging through a resistor. • Recall and use $\tau = RC$ for the time constant for a capacitor discharging through a resistor. • Use equations of the form $x = x_0 e^{-(t / RC)}$

SUBJECT - ECONOMICS

TOPIC/UNIT	**CONTENT**
UNIT- 7: The price system & the microeconomy	7.1 Utility 7.2 Indifference curves & budget line 7.3 Efficiency & market failure 7.4 Private costs and benefits, externalities and social costs and benefits 7.5 Types of cost, revenue and profit, short-run and long-run production 7.6 Different market structures 7.7 Growth and survival of firms 7.8 Differing objectives and policies of firms
UNIT- 8: Government microeconomic intervention	8.1 Government policies to achieve efficient resource allocation and correct market failure 8.2 Equity and redistribution of income and wealth 8.3 Labour market forces and government intervention
UNIT-9: The macroeconomy	9.1 The circular flow of income 9.2 Economic growth and sustainability 9.3 Employment/unemployment 9.4 Money and banking

UNIT-10: Government macroeconomic intervention	10. 1 Government macroeconomic policy objectives 10. 2 Links between macroeconomic problems and their interrelatedness 10.3 Effectiveness of policy options to meet all macroeconomic objectives
UNIT - 11: International economic issues	11.1 Policies to correct disequilibrium in the balance of payments 11.2 Exchange rates 11.3 Economic development 11.4 Characteristics of countries at different levels of development 11.5 Relationship between countries at different levels of development 11.6 Globalization

SUBJECT - CHEMISTRY

TOPIC/UNIT	**CONTENT**
10. Introduction to Organic Chemistry 11. Hydrocarbons (AS Level Pending)	• Representing organic molecules • Homologous series of organic compounds • Naming organic compounds • Bonding in organic compounds • Structural Isomerism • Stereoisomerism • Types of organic reactions and mechanism • Homologous groups of alkanes • Reaction of alkanes • The alkene • Oxidation of alkenes • Addition polymerisation • Questions practice
12. Halogenoalkanes 13. Alcohols, esters and carboxylic acids	• Making halogenoalkane • Nucleophilic Substitution

14. Carbonyl Compounds (AS Level Pending)	• Mechanism of Reaction • Elimination Reaction • Homologous series of alcohols • Reaction of alcohols • Carboxylic Acids • The homologous series of aldehydes and ketones • Preparation of aldehydes and ketones • Reduction of aldehydes and ketones • Nucleophilic addition with HCN
15. Benzene and its compounds 16. Carboxylic acids and their derivatives 17. Organic Nitrogen Compounds	• The benzene rings • Reaction of arenes • Phenol • Reaction of phenol • The acidity of carboxylic acids • Oxidation of two carboxylic acids • Acyl Chlorides • Amines • Amino acids • Peptides • Reaction of amides • Electrophoresis
18. Lattice Energy 19. Entropy and Gibbs free Energy	• Define lattice energy • Enthalpy change of atomisation and electron-affinity • Born-Haber cycles • Enthalpy changes in solutions • Introduction entropy • Chance and Spontaneous change • Calculating entropy changes • Entropy, enthalpy changes and Gibbs free energy • Gibbs free energy calculations
20. Transition Elements	• What is a transition elements • Physical and chemical properties of the transition elements • Ligands and complex formations

21. Electrochemistry	• Redox Reaction • Electrolysis • Quantitative electrolysis • Electrode potentials • Combining half-cells • Using E Values
22. Further aspects of equilibria	• More about electrolysis • Conjugate acids and conjugate base • pH calculations • Weak acids: using the acids dissociation constant, Kc
22. Further aspects of equilibria 23. Reaction Kinetics	• Buffer Solutions • Equilibrium and Solubility • Partition Coefficients • Rate of reaction and factors affecting it • Rate equations • Calculations involving the rate constant, K • Deducing order of reaction from raw data • Kinetics and reduction mechanism • Catalysis
24. Polymerisation	• Condensation polymerisation • Synthetic polyamides • Biochemical polyamides • Degradable polymers • Polymer deduction

SUBJECT - WELL BEING

TOPIC/UNIT	CONTENT
Introduction to Wellbeing	• Introduction • Prominent features of wellbeing
Exploring Prospective Courses & Universities	• Navigating the desired courses • Creation of detailed Course-specific Prospective Universities List

Elements of University Application	• Significant aspects of university application both in India & Abroad • Introduction to Popular Application Portals
Personal Essay	• Introduction to Personal Essay • Tips & Strategies for Creating a suitable personal essay
Statement of Purpose	• Introduction to Statement of Purpose • Tips & Strategies for Creating a suitable Statement of purpose
Time management	• Significance of time-management in academic journey • Techniques for Managing time
Understanding myself	• Understanding emotions • Impact of Coping styles • Practising Healthy lifestyle • Impact of Screen time on health
Managing Examination Stress	• Distinguishing the stressors • Techniques for Managing Examination stress

*If any subject is not listed, we will provide the information for it by next week.