SYLLABUS FOR ENTRANCE EXAMINATION

PART 1 - ENGLISH (10 Questions)

As per the Intermediate Second Year Syllabus

PART 2 - PHYSICS (30 Questions)

UNIT 1: Units and Measurement
Units for measurement, system of units-S.I., fundamental and derived units, measurements-errors in measurement significant figures, dimensions-dimensional analysis-applications

UNIT 2: Mechanics
Motion in one dimension-uniform and non-uniform motion-uniformly accelerated motion-scalar and vector quantities-Newton's laws of motion-force and inertiaimpulse and momentum-law of conservation of linear momentum-applications-motions in two dimensionprojectile motion-uniform circular motion-friction-laws of friction-applications- centripetal force-centre of mass-torque-angular momentum and its conservation-moment of inertia-theorems of moment of inertia - work - energypotential energy and kinetic energy-power-collision-elastic and inelastic collisions

UNIT 3: Gravitation, Mechanics of Solids and Fluids
The universal law of gravitation, acceleration due to gravity-variation of 'g' with altitude, latitude and depth-gravitation potential-escape velocity and orbital velocitygeostationary satellites-Kepler's laws of planetary motion. Solids-elastic behaviour, stress-strain-Hooke's law-Modulli of elasticity-relation between them-surface tension-capillarity-applications-viscosity-Poiseuille's formula-Stokes law-applications-streamline and turbulent_ow-Reynolds number-Bernoulli's theoremapplications.

UNIT 4: Oscillations and Wave Motion
Periodic motion-simple harmonic motion-equations of motion-oscillations of spring-simple pendulum-free, forced and damped oscillations-resonance-applicationswave motions-longitudinal and transverse waves-velocity of wave motion in different media-Newton's formula- Laplace's correction-super position of waves-progressive and standing waves-sonometer-air columns-Doppler effect and its applications

UNIT 5: Heat and Thermodynamics
Kinetic theory of gases-postulates-pressure of a gasspecific heat capacity-relation between Cp and Cv-_rst law of thermodynamics thermodynamical processesisothermal adiabatic-reversible and irreversible process-second law of thermodynamics-Carnot's engine-Heat transfer-conduction-convection-radiation-thermal conductivity of solids-black body radiations-Kirchoff's law-Wien's displacement law-Stefan's law-Newton's law of cooling.

UNIT 6: Ray and Wave Optics and Magnetism
Wavefront – Huygens principle – wave nature of light – interference – young's double slit enpriment – diffraction and polarization – relection and refraction of light – total internal reflection – velocity of light determination – deviation and dispersion of light by a prism–lens

UNIT 7: Electricity and Magnetism
Magnetism: Earth's magnetic field and magnetic elements– magnetic field due to a magnetic dipole – torque on a magnetic dipole – magnetic properties of a material – dia, para and ferro magnetic materials – application. Biof savart law – force on a moving charge in an uniform magnetic field. Electrostatic – coulomb's inverse square law – dielectric constant – electric field – electric lines of force – electric dipole – electric potential – potential difference – electric flux – gauss theorem – electrostatic inclusion – capacitor capritor in parallel and series – drift. Velocity of electrons – ohm's law – electrical resistivity and conductivity – super conductivity – kirchoff's law – what's tone's bridge – principle potentiometer – electric power – faraday's law – lenz law at electromagnetic inclusion – self inductances mutual inductance – flemming's right hand rule – methods of inducing emt – eddy current, transformer.

UNIT 8: Atomic Physics and Relativity
Relativity – Einstien's mars energy relation – variation of mass with velocity. Atomic structure-properties of cathode rays and positive rays - specific charge of an electron-atom model – Thomson atom model-Rutherford atom model- Bohr atom model-merits and demerits-quantum numbers- X-rays-production-properties-Bragg's law-Bragg's - Xray spectrometer-Photoelectric effect-laser-spontaneous and stimulated emission-laser action-characteristics of laser light-ruby laser-applications of laser.

UNIT 9: Dual Nature of Matter and Nuclear Physics

Nuclear properties: radius, mass, binding energy, density, isotopes, mass defect – Bainbridge mass spectrometer – nuclear forces. Newton discovery, matter coaves – wave nature of particles – Debroglie wavelength – electron microscope – radioactivity α, β and γ decay – half life and mean life – artificial radio activity – radio isotopes – radio corbon dating – radiation harards – nuclear fission – nuclear reactor – nuclear fusion – hydrogen bomb – cosmic rays – elementary particles.

UNIT 10: Electronics and Communication

Communication: Space communication – propagation of electromagnetic waves in atmosphere – sky and space wave propagation. Electronics: Semiconductor – doping – types – PN junction diode – biasing – amplifier – gain – feedback in amplifier's – logic gates – NOT, OR, AND, NOR, NAND – Universal gaies – De Morgan's theorems.

PART 3 - CHEMISTRY (30 Questions)

UNIT 1: Some Basic Concepts in Chemistry

Matter and its nature, Dalton's atomic theory; concept of atom, molecule, element and compound; physical quantities and their measurements in chemistry, precision and accuracy, signi_cant _gures, S.I. Units, dimensional analysis; laws of chemical combination;atomic and molecular masses, mole concept, molar mass, percentage composition, empirical and molecular formulae; chemical equations and stoichiometry

UNIT 2: States of Matter

Classi_cation of matter into solid, liquid and gaseous states. Solid State: Classi_cation of solids: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea); Bragg's Law and its applications; unit cell and lattices, packing in solids (fcc, bcc and hcp lattices), voids, calculations involving unit cell parameters, imperfection in solids; electrical, magnetic and dielectric properties. Liquid State: Properties of liquids – vapour pressure, viscosity and surface tension and effect of temperature on them (qualitative treatment only). Gaseous State: Measurable properties of gases; Gas laws-Boyle's law, Charle's law, Graham's law of diffusion, Avogadro's law, Dalton's law of partial pressure; concept of absolute scale of temperature; ideal gas equation, kinetic theory of gases (only postulates); concept of average, root mean square and most probable velocities; real gases, deviation from ideal behaviour, compressibility factor, Van der Waals equation, liquefaction of gases, critical constants.

UNIT 3: Chemical Families - Periodic Properties

Modern periodic law and present form of the periodic table, s & p block elements, periodic trends in properties of elements, atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states and chemical reactivity. Transition elements-d-block elements, inner transition elements-f-block elements. Ionization energy, lanthanides and actinides-general characteristics. Coordination Chemistry: Coordination compounds, nomenclature: terminology - Werner's coordination theory. Applications of coordination compounds.

UNIT 4: Atomic Structure

Discovery of sub-atomic particles (electron, proton and neutron); Thomson and Rutherford atomic models and their limitations; nature of electromagnetic radiation, photoelectric effect; spectrum of hydrogen atom, Bohr model of hydrogen atom-its postulates, derivation of the relations for energy of the electron and radii of the different orbits, limitations of Bohr's model; dual nature of matter, De-Broglie's relationship, (Angular momentum and magnetic quantum numbers) and their signi_cance; shapes of s, p and d-orbitals, electron spin and spin quantum number; rules for _lling electrons in orbitals–Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic con_guration of elements, extra stability of half- _lled and completely _lled orbitals.

UNIT 5: Chemical Bonding and Molecular Structure

Covalent bonding: Concept of electronegativity, Fajan's rule, dipole moment; Valence Shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules. Valence bond theory - Its important features, concept of hybridization involving s, p and d orbitals; resonance. types of molecular orbitals (bonding, antibonding), sigma and pi-bonds, molecular orbital electronic con_gurations of homonuclear diatomic molecules, concept of bond order, bond length and bond energy. Elementary idea of metallic bonding. Hydrogen bonding and its applications. Extractive metallurgy of sodium, lithium, properties of alkali metals, basic nature of oxides and hydroxides, compounds of alkaline earth metals, compounds of boron. Oxides, carbides, halides and sulphides of carbon group.

UNIT 6: Solutions

Different methods for expressing concentration of\ solution-Molality, molarity, mole fraction, percentage (by volume and mass both), vapour pressure of solutions and Raoult's law-ideal and non-ideal solutions, vapour pressure-composition plots for ideal and

non-ideal solutions; colligative properties of dilute solutionsrelative lowering of vapour pressure, depression of freezing point, elevation of boiling point and osmotic pressure; determination of molecular mass using colligative properties; abnormal value

UNIT 7: Chemical Equilibrium

Meaning of equilibrium, concept of dynamic equilibrium. Equilibria involving physical processes: Solid-liquid, liquid-gas and solid-gas equilibria, Henry's law, Equilibria involving chemical processes: Law of chemical equilibrium, equilibrium constants (Kp and Kc) and their signi_cance, Le Chatelier's principle. Ionic equilibrium: Weak and strong electrolytes, ionization of electrolytes, various concepts of acids and bases (Arrhenius, Bronsted- Lowry and Lewis) and their ionization, acid-base equilibria (including multistage ionization) and ionization constants, ionization of water, pH scale, common ion effect, hydrolysis of salts and pH of their solutions, solubility of sparingly soluble salts and solubility products, buffer solutions.

UNIT 8: Electrochemistry

Electrolytic and metallic conduction, conductance in electrolytic solutions, speci_c and molar conductivities and their variation with concentration: Kohlrausch's law and its applications. Electrochemical cells-Electrolytic and Galvanic cells, different types of electrodes, electrode potentials including standard electrode potential, half-cell and cell reactions, emf of a galvanic cell and its measurement; Nernst equation and its applications; dry cell and lead accumulator; fuel cells; corrosion and its prevention.

UNIT 9: Surface Chemistry, Chemical Kinetics and Catalysis

Adsorption-Physisorption and chemisorption and their characteristics, factors affecting adsorption of gases on solids-Freundlich and Langmuir adsorption isotherms, adsorption from solutions. Catalysis. Tyndall effect, Brownian movement, electrophoresis, dialysis, coagulation and _occulation; emulsions and their characteristics. Factors affecting rates of reactions - factors affecting rate of collisions encountered between the reactant molecules, effect of temperature on the reaction rate, concept of activation energy, catalyst. Rate law expression. Order of a reaction (with suitable examples). Units of rates and speci_c rate constants. Nuclear Chemistry: adioactivity: isotopes and isobars: Properties of _, _ and _ rays; Kinetics of radioactive decay (decay series excluded), carbon datting.

UNIT 10: Some Basic Principles of Organic Chemistry

Tetravalency of carbon; shapes of simple moleculeshybridization (s and p); classi_cation of organic compounds based on functional groups: -C=C-, -C_C- and those containing halogens, oxygen, nitrogen and sulphur; homologous series; isomerism-structural and stereoisomerism. Nomenclature (Trivial and IUPAC) Covalent bond _ssion - Homolytic and heterolytic: free radicals, carbocations and carbanions; stability of carbocations and free radicals, electrophiles and nucleophiles. Electronic displacement in a covalent bond-inductive effect, electromeric effect, resonance and hyperconjugation.

UNIT 11: Hydrocarbons

Classi_cation, isomerism, IUPAC nomenclature, ge eral methods of preparation, properties and reactions. Alkenes- Geometrical isomerism; mechanism of electrophilic addition: addition of hydrogen, halogens, water, hydrogen halides (Markownikoff's and peroxide effect); ozonolysis, oxidation, and polymerization. Mechanism of electrophilic substitution: halogenation, nitration, Friedel- Craft's alkylation and acylation, directive in_uence of functional group in monosubstituted benzene

UNIT 12: Organic Compounds Containing Oxygen

General methods of preparation, properties, reactions and uses. Alcohols: Distinction of primary, secondary and tertiary alcohols; mechanism of dehydration. Reactions of hydroxyl derivatives. Phenols: Acidic nature, electrophilic substitution reactions: halogenation, nitration and sulphonation, Reimer-Tiemann reaction. Addition to >C=O group, relative reactivities of aldehydes and ketones. Ethers: Structure. Aldehyde and Ketones: Nature of carbonyl group; Nucleophilic addition reactions (addition of HCN, NH3 and its derivatives), Grignard reagent; oxidation; reduction (Wolff Kishner and Clemmensen); acidity of-hydrogen, aldol condensation, Cannizzaro reaction, Haloform reaction; Chemical tests to distinguish between aldehydes and Ketones. Carboxylic acids: Reactions, Acidic strength and factors affecting it; reactions of acid derivatives

UNIT 13: Organic Compounds Containing Nitrogen

General methods of preparation, properties, reactions and uses. Amines: Nomenclature, classi_cation, structure, basic character and identi_cation of primary, secondary and tertiary amines and their basic character.

UNIT 14: Polymers
General introduction and classi_cation of polymers, general methods of polymerization–addition and condensation, copolymerization; natural and synthetic rubber and vulcanization; monomers and uses - polythene, nylon, polyester and bakelite.

UNIT 15: Chemistry in Everyday Life
Chemicals in medicines-Analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids. Cleansing agents–Soaps and detergents, cleansing action.

PART 4 - MATHEMATICS (30 Questions)

UNIT 1: Sets, Relations and Functions

UNIT 2: Complex Numbers

UNIT 3: Matrices and Determinants

UNIT 4: Applications of Matrices and Determinants

UNIT 5: Quadratic Equations

UNIT 6: Permutations and Combinations

UNIT 7: Mathematical Induction and its Applications

UNIT 8: Trigonometry

UNIT 9: Sequences and Series

UNIT 10: Differential Calculus

UNIT 11: Aplications of Differential Calculus

UNIT 12: Integral Calculus

UNIT 13: Differential Equations

UNIT 14: Straight Lines in Two Dimensions

UNIT 15: Circles in Two Dimensions

UNIT 16: Conic Sections in Two Dimensions

UNIT 17: Vector Algebra

UNIT 18: Measures of Central Tendency and Dispersion

UNIT 19: Probability

PART 4: BIOLOGY (30 Questions)

BOTANY

Unit 1: Taxonomy of Angiosperm Types of classifications - Artificial, Natural, Phylogenetic - Biosystematics - Binomial Nomenclature - Herbaria and their uses- Bentham and Hook er's classification of plants - Families Malvaceae, Solanaceae - Euphorbiaceae, Musaceae and Economic Importance.

Unit 2: Plant Anatomy
Tissues and Tissue System - anatomy of monocot and dicot roots - anatomy of Monocot and dicot stem and anatomy of dicot leaf.

Unit 3: Cell Biology and Genetics
Chromosomes - Structure and types - genes recombination of chromosomes mutation - chromosomal aberration - DNA as genetic material- Structure of DNA - replication of DNA - Structure of RNA and its type

Unit 4: Biotechnology
Recombinant DNA Technology - Transgenic plants with beneficial traits - plant tissue culture and its application - Protoplasmic fusion

Unit 5: Plant Physiology
Photosynthesis - Significance - site of photosynthesis - photochemical and biosynthetic phases - electron transport system - cyclic and non cyclic photophosphorylation - C3 and C4 pathway - photorespiration - factor affecting photosynthesis - fermentation - plant growth - growth regulators - phytohormones - auxin - gibberellins - cytokinins - ethylene.

Unit 6: Biology in Human Welfare
Food production - breeding experiments - improved varieties and role of biofertilizer - crop diseases and their control - biopesticides - genetically modied food - sustained agriculture and medicinal plants includin microbes.

ZOOLOGY

Unit I: Human Physiology Nutrition - introduction - carbohydrates - proteins - lipids - vitamins mineral - water - Balanced diet - calorie value - (ICBM standard) obesity - Hyperglycemia - hypoglycemia - malnutrition. Digestion - enzymes and enzyme action - Bones and Joints (Major types) - Muscles - muscle action - muscle tone - Rigor Mortis - aerobic exercises (body building) myasthenia gravis.

Respiration - Process of pulmonary respiration - inspiration Expiration - Exchange of gases at alveolar level - Circulation - Functioning of heart origin and conduction of heart beat - Artificial pacemaker - coronary blood vessels and its significance - myocardial infarction - Angina pectoria - Atherosclerosis - heart attack -Resuscitation in heart attack (First aid) Blood components-functions-plasma-corpuscles-blood clotting-anticoagulants-Thrombosis-embolism-blood related diseases like polycythemia-Leukemia-Lymph fluid.

Physiological Co ordination System: Brain-functioning of different regions-memory-sleepstroke- Alzheimer's disease-meningitis-Thyroidparathyroid hormones-insulin and glucagon-Hormones of adrenal cortex and medulla-Reproductive hormonesproblems related to secretion, non secretion of hormones.

Receptor Organs: Eye-Focussing mechanism and photo chemistry of retina-short sightedness-Nyctalopia-Eye infection-conjunctivitis-Glaucoma-Ear-Hearing mechanism-Hearing impairments and aids - Noise pollution and its importance-skin-melanin functions - Effect of solar radiation / UV Excretion:

Ureotelism-urea-Biosynthesis(ornithine cycle) Nephron-ultrafiltration-tubular reabsorption and tubular secretion-Renal failure-Dialysis kidney stone formation kidney transplantation-Diabetes.

Reproductive System: Brief account of spermatogenesis and oogenesismenstrual cycle-in vitro fertilization-Birth control

Unit 2: Microbiology

Introduction-History of medical microbiology-The influence of Pasteur, Koch and Lister-Virology-structure Genetics culture and diseases-AIDS and its control-Bacteriology-structure, Genetics and diseases-protozoan microbiology-Diseases oriented-pathogenecity of micro organism-anti microbial resistance chemotherapy. Single cell protein. Microbial culture technique and its applications - Strain Isolation and Improvement - Isolation of microbial products.

Unit 3: Immunology

Innate immunity (Non specic) - anatomical Barriers-Physiological barriers-phagocytic barriers Lymphoidal organs-Thymus- Bursa of fabricius- Peripheral Lymphoid organs-Lymph nodes- Transplantation immunology-Autoimmune disorders.

Unit 4: Modern Genetics and Animal Biotechnology

Introduction-scope-Human Genetics Karyotyping Chromosome gene mapping-Recombinant DNA technology and segmenting-genetic diseases-Human genome project-cloning-Transgenic organisms- Genetically modified organism(GMO)-Gene therapy- Animal cell culture and its applications-Stem cell technology-Bioethics of genetic engineering in animals.

Unit 5: Environmental Science

Human population and explosion-issue-Global Warming Crisis-Green house effect-Ozone layer depletion-waste management-Biodiversity conservation (Biosphere reserve)

Unit 6: Applied Biology

Livestock and management-Breeds-Farming method-poultry diseases-Economic value Pisciculture

Unit 7: Theories of Evolution

Lamarckism-Darwinism-Modern concept of natural selection-species of concept-origin of species and isolating mechanism.