I. INTRODUCTION

The SRK University is a multidisciplinary university known for high standard in teaching and research and attracts eminent scholars to its faculty across the academic spectrum. The group was established in 1995 under the flagship of RKDF Group ever since its inception, a strong commitment to excellence in teaching and research has made the group a role model and path-setter for other institutions. Its rich academic tradition has always attracted the most talented students who later play important contributions to their society. We have a felicitous reputation for last 21 Years of excellence, as demonstrated by host of educational institutions already operating under flagship banner i.e. RKDF EDUCATION SOCIETY.

The group already have 2 established universities namely RKDF UNIVERSITY & SSSUTMS which are running successfully. SRK UNIVERSITY is offering full time degree at undergraduate, postgraduate and research level in the field of Medical, Dental, Nursing, Pharmacy, Management, Homeopathic, Engineering & Technology, Arts, Commerce, Science, Agriculture etc.

II. ELIGIBILITY CRITERIA FOR ADMISSION

Minimum Qualification for admission to the first year Engineering /Pharmacy shall be the Qualifying Higher Secondary School Certificate (10+2) Scheme with Physic, Chemistry and Mathematics/Biology securing minimum 45% marks (5% will be relaxed for SC/ST other categories for M.P) conducted by M.P. board of Secondary Education or an equivalent examination from a recognized board/University.

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NOTE:
NON RESIDENT INDIAN (NRI) AND CANDIDATES OF FOREIGN ORIGIN ARE NOT ELIGIBLE TO APPEAR FOR THIS ENTRANCE EXAMINATION.

III ENTRANCE EXAMINATION AND ADMISSION PROCEDURE

1. PRIMARY INFORMATION TO ALL CANDIDATES APPLYING FOR ENTRANCE EXAMINATION - 2016

Candidates are required to assure themselves that they possess the requisite eligibility criteria for admission to a programme before applying for entrance examination.

Based on 12 class syllabus (refer page no. for detailed syllabus), entrance examination will be conducted in Mathematics, Biology, Physics and Chemistry. All candidates must appear for Physics & Chemistry. A candidate can appear for either Mathematics or Biology as optional subject depending on the opted programme of study (refer eligibility criteria in page no.).

Permitting a candidate to appear for the Entrance Examination-2016 or counselling does not entitle the right for admission.

Candidates who have been offered Provisional Admission after counselling should submit the relevant original documents, such as HSC Mark sheet, Transfer Certificate, Migration, etc. to the University at the time of admission. If not, the admission will stand cancelled.

After the admission, at a later point of time if any discrepancy or malpractice is noticed in the submitted documents, the candidate's admission will be cancelled by the University.

2. ADMISSION PROCEDURE:

The admission to B.E., /Pharmacy , programmes is done solely on the basis of the performance in the All India B.E/Pharmacy Entrance Examination 2016 conducted by SRK University.

The candidates will be shortlisted and called for Counselling, based on their performance in the entrance examination-2016. On the day of counselling the branch of study will be allotted depending on the availability of seat and provisional admission order will be issued on the same day.

ALLOTMENT OF BRANCH ONCE MADE DURING THE COUNSELLING IS FINAL AND CANNOT BE CHANGED UNDER ANY CIRCUMSTANCES.

3. APPLICATION PROCEDURE FOR B.E / Pharmacy ENTRANCE EXAMINATION-2016

To apply for Entrance Examination-2016, the eligible candidate may choose any one of the following options:

a. APPLICATION FORM (OFFLINE):

Eligible candidates can get the application form on payment of Rs.500/- at SRK University campus . (Bank Details is available in the University Website)

Application forms may also be obtained through post by sending a request letter (candidate's mailing address should be mentioned clearly in capital letters with pin code number, mobile number and E - Mail ID) along with a demand draft for Rs500/- drawn in favour of SRK University, payable at Bhopal.
This request letter should reach the University on or before 15 May, 2016 addressed to “The Co-ordinator, Entrance Examination-2016, SRK University, NH-12, Hoshangabad Road Bhopal-462026

Filled in Application Form can be sent to Registrar, SRK University, NH-12, Hoshangabad Road Bhopal 462026” on or before 21 May, 2016 along with DD.

b. APPLICATION FORM (ONLINE MODE):

Candidates can also use online submission of application which is available at www.srku.edu.in. Candidates opting for online submission should fill the application and verify all the details entered. After the verification of the details, online payment of Rs. 500 should be made either by using Net Banking Facility/Credit Card/Debit Card or off line payment (only by union Bank Challan mode) at any one of the union BANK branches.

The candidates who have submitted the applications through online mode need not send any printed forms/account statement/bank or institution challan copy etc. unless otherwise requested by university authorities.

Applications without the fee payment will not be considered.

4. RECEIPT OF ENTRANCE EXAMINATION-2016 APPLICATIONS

Last date for receipt of filled-in Application Form at the university office: 22 May 2016.

Applications received after the due date will not be processed and rejected.

CANDIDATES ARE REQUESTED TO RETAIN A PHOTO COPY OF THE FILLED IN APPLICATION FORM FOR FUTURE REFERENCE.

The university will not be responsible for any postal delay, loss in postal transit or any damage of the Application Form.

ENTRANCE EXAMINATION-2016 INSTRUCTIONS:

TRACK YOUR ENTRANCE EXAMINATION-2016 APPLICATION

After submission of application form either online mode or offline mode, a candidate can track his/her application through our website www.srku.edu.in /

After processing the applications received by offline mode, the details of a candidate will be uploaded in the website www.srku.edu.in

candidate can track his/her application form by entering the application number/ Date of Birth. After submission of application number, the candidate's data will be displayed in the window. For any corrections, the candidate has to send a request mail to entranceexam@srku.edu.in. This request mail must be sent from an E-Mail, which was given by the candidate in the Application Form.

E-Mail may be sent to entranceexam@srku.edu.in for any assistance to track the application by mentioning the application number, candidate's name & aadhaar number, (if available) father's/guardian's name, mobile number and date of birth of the candidate.

c. HALL TICKET
After successfully submission, the hall tickets should be downloaded from the university website and printout has to be taken on A4 white paper after 22 May 2016

SRK University is not responsible for the incomplete data given by the candidate in the datasheet. Candidates are advised to ensure that the Entrance Examination application form (Application Form) submitted is complete in all aspects.

The Hall Ticket will contain Name of the Candidate, photograph of the candidate, address of the Exam Centre allotted, Examination Timings.

COUNSELLING PROCEDURE AND ADMISSION

The counselling schedule will be published in university website www.srku.edu.in, after the Publications of results. Candidates can download and take a printout of their counselling call letter from our website and appear for the counselling as per the counselling schedule. Details regarding counselling venues, dates and fees will be mentioned in the counselling call letter.

Change of date / time of counselling is generally not permissible. If a candidate does not personally appear for counselling on the date and time specified, his / her seat shall be offered to the next candidate in the order of merit.

REQUIRED DOCUMENTS IN ORIGINAL TO BE SUBMITTED DURING COUNSELLING & ADMISSION.

The candidates should produce the following documents in original along with one set of photocopies while reporting for counselling. Candidates will not be allowed to participate in the counselling process without these documents.

- Counselling call letter.
- SRK University Entrance Examination-2016 Hall Ticket
- Secondary School (Class X) mark sheet.
- HSC Mark sheet (Class XII).
- Transfer Certificate
- Migration Certificate
- If a candidate fails to produce any of these documents, he / she will not be considered for counselling.
- Colour passport size Photographs of the candidate.

The branch of study will be allotted as per the marks secured in the Entrance Examination and availability of seats on that particular date at the time of counselling. After the allotment of branch of study, provisional admission letter will be issued to the candidate. Last date for the submission of remaining fee, submission of original certificates and other admission procedures will be mentioned in the admission offer letter.

A candidate should make a decision before the payment of the fee, whether he / she should join the programme based on the branch allotted to him / her at the time of counselling.

Allotment of branch once made is final and cannot be changed under any circumstances.

The candidates called for counselling will have to pay the prescribed counselling fee of Rs. 1500/- (after the selection of the programme/branch that is available at the time of counselling) by way of Demand Draft drawn in favour of “Registrar SRK University”, payable at Bhopal.
After the payment of the counselling fee (Rs. 1500/-), if a candidate wants to withdraw the admission, No Refund is Possible.
A candidate’s admission will be confirmed only after the payment of remaining tuition and other fee.

IV. FEE DETAILS For BE

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For B Pharmacy

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** Allotment of hostel facility will be on first come first serve basis.

The entire fee must be paid only by online mode. The detailed procedure for online payment will be informed at the time of counselling. Payment of fee by instalment/s is not entertained.

V. SCHOLARSHIP

a. The top 10 rank holders of SRK University entrance examination-2016 will be eligible for scholarship i.e FULL WAIVER OF TUITION FEE throughout the duration of the programme (4 years).

b. University offers SCHOLARSHIP to students who secure the top three positions in the University Semester Examinations. A student consistently maintains top rank in eight consecutive semesters is eligible for a maximum Scholarship.

VI. IMPORTANT DATES TO REMEMBER
Date of commencement of Online Application Form | Tuesday, March 15, 2016
---|---
Last date for application | Monday, 23 May, 2016
Admit Card Go live | Tuesday, June 24, 2016
Date of Sarvepalli Radhakrishnan University Entrance Examination (SRKUEE) | Sunday, May 29, 2016
Exam Timings | 10:00 AM to 12:30 PM
Mode of Examination | offline
Result Announcement Date | Monday, June 13, 2016
SRKU Helpline No. | 0755 – 4700981-87

VII. QUESTION PAPER PATTERN AND MAXIMUM MARKS

The Question paper is divided into three parts.

PART – A Comprises of 60 questions from Physics and Chemistry (30 questions each) of multiple choice type.

PART– B Comprises of 60 questions from Mathematics of multiple choice type.

PART – C Comprises of 60 questions from Biology of multiple choice type.

PART – A – Compulsory for all the students.

Candidates can choose either PART – B (Mathematics) or PART – C (Biology).

Students who answer PART – B are eligible for all B.E./Pharmacy programme.

Students who answer PART – C are eligible for Pharmacy only.

EACH QUESTION CARRIES ONE MARK AND NO NEGATIVE MARKS FOR WRONG ANSWERS

IMPORTANT INFORMATION

University do not have any agent or middle men or broker for university admissions. We have only one campus at Bhopal.

Official website of SRK University is www.srku.edu.in

Entrance examination application fee (Rs. 500/-) will not be refunded under any circumstances.

Candidates are requested to enter the contact mobile number properly in Application Form.

Candidates are requested to write their contact E-Mail ID in capital letters neatly and legibly in Application Form.

Hall ticket/Results/Counselling call letter should be only downloaded from our web site and will not be sent by post under any circumstances.

Candidates are advised to check the SMS, E-Mail frequently.

Candidates are advised to visit www.srku.edu.in for regular updates regarding Entrance Examination-2016.

A candidate must appear for both physics and chemistry in the entrance examination.
A candidate can select either Mathematics or Biology as optional subject in the entrance examination.

For any assistance candidates can send an E-Mail to entranceexam@srku.edu.in by mentioning their application number (if applied), name of the candidate, father's/guardian's name, mobile number, date of birth and aadhaar number (if available).

Contact 0755-4700983 (between 8.15 A.M and 3.45 P.M except public holidays) for any enquiry regarding entrance examination.
VIII. SYLLABUS

UNIT 1: PHYSICS AND MEASUREMENT

Physics, technology and society, S I units, Fundamental and derived units. Least count, accuracy and precision of measuring instruments, Errors in measurement, Significant figures. Dimensions of Physical quantities, dimensional analysis and its applications.

UNIT 2: KINEMATICS

Frame of reference. Motion in a straight line: Position time graph, speed and velocity. Uniform and non uniform motion, average speed and instantaneous velocity Uniformly accelerated motion, velocity-time, position-time graphs, relations for uniformly accelerated motion. Scalars and Vectors, Vector addition and Subtraction, Zero Vector, Scalar and Vector products, Unit Vector, Resolution of a Vector, Relative Velocity, Motion in a plane, Projectile Motion, Uniform Circular Motion.

UNIT 3: LAWS OF MOTION


UNIT 4: WORK, ENERGY AND POWER

Work done by a constant force and a variable force; kinetic and potential energies, work-energy theorem, power. Potential energy of a spring, conservation of mechanical energy, conservative and nonconservative forces; Elastic and inelastic collisions in one and two dimensions.

UNIT 5: ROTATIONAL MOTION

Centre of mass of a two-particle system, Centre of mass of a rigid body; Basic concepts of rotational motion; Moment of a force, torque; angular momentum, conservation of angular momentum and its applications; moment of inertia, radius of gyration. Values of moments of inertia for simple geometrical objects, parallel and perpendicular axes theorems and their applications. Rigid body rotation, equations of rotational motion.

UNIT 6: GRAVITATION


UNIT 7: PROPERTIES OF SOLIDS AND LIQUIDS


UNIT 8: THERMODYNAMICS
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UNIT 9: KINETIC THEORY OF GASES

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, applications to specific heat capacities of gases; Mean free path, Avogadro's number.

UNIT 10: OSCILLATIONS AND WAVES


UNIT 11: ELECTROSTATICS

Electric charges: Conservation of charge, Coulomb's law-forces between two point charges, forces between multiple charges; superposition principle and continuous charge distribution. Electric field: Electric field due to a point charge, Electric field lines, Electric dipole, Electric field due to a dipole, Torque on a dipole in a uniform electric field. Electric flux, Gauss's law and its applications to find field due to infinitely long uniformly charged straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell. Electric potential and its calculation for a point charge, electric dipole and system of charges; Equipotential surfaces, Electrical potential energy of a system of two point charges in an electrostatic field. Conductors and insulators, Dielectrics and electric polarization, capacitor, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, Energy stored in a capacitor.

UNIT 12: CURRENT ELECTRICITY


UNIT 13: MAGNETIC EFFECTS OF CURRENT AND MAGNETISM


UNIT 14: ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS

Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance. Alternating currents, peak and rms value of alternating current/ voltage; reactance and impedance; LCR series circuit, resonance; Quality factor, power in AC circuits, current. AC generator and transformer.
UNIT 15: ELECTROMAGNETIC WAVES

Electromagnetic waves and their characteristics. Transverse nature of electromagnetic waves. Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays). Applications of e.m. waves.

UNIT 16: OPTICS

Reflection and refraction of light at plane and spherical surfaces, mirror formula, Total internal reflection and its applications, Deviation and Dispersion of light by a prism, Lens Formula, Magnification, Power of a Lens, Combination of thin lenses in contact, Microscope and Astronomical Telescope (reflecting and refracting) and their magnifying powers. Wave optics: wavefront and Huygens' principle. Laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescopes, Polarisation, plane polarized light; Brewster's law, uses of plane polarized light and Polaroids.

UNIT 17: DUAL NATURE OF MATTER AND RADIATION


UNIT 18: ATOMS AND NUCLEI

Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isotobars; isotones. Radioactivity alpha, beta and gamma particles/ rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number, nuclear fission and fusion.

UNIT 19: ELECTRONIC DEVICES

Semiconductors; semiconductor diode: I-V characteristics in forward and reverse bias; diode as a rectifier; I-V characteristics of LED, photodiode, solar cell and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch.

UNIT 20: COMMUNICATION SYSTEMS

Propagation of electromagnetic waves in the atmosphere; Sky and space wave propagation, Need for modulation, Amplitude and Frequency Modulation, Bandwidth of signals, Bandwidth of Transmission medium, Basic Elements of a Communication System (Block Diagram only).

CHEMISTRY

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, significant figures, 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

Classification of matter into solid, liquid and gaseous states.

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.
SRK University

(only postulates); Concept of average, root mean square and most probable velocities; Real gases, deviation from Ideal , compressibility factor, van der Waals equation, liquefaction of gases, critical constants.

Liquid State:

Properties of liquids – vapour pressure, viscosity and surface tension and effect of temperature on them (qualitative treatment only).

Solid State:

Classification 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.

UNIT 3: 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, Heisenberg uncertainty principle. Elementary ideas of quantum mechanics, quantum mechanical model of atom, its important features, and concept of atomic orbitals as one electron wave functions; Variation of and with r for 1s and 2s orbitals; various quantum numbers (principal, angular momentum and magnetic quantum numbers) and their significance; shapes of s, p and d – orbitals, electron spin and spin quantum number; Rules for filling electrons in orbitals aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of elements, extra stability of half-filled and completely filled orbitals.

UNIT 4: CHEMICAL BONDING AND MOLECULAR STRUCTURE

Kossel – Lewis approach to chemical bond formation, concept of ionic and covalent onds.

Ionic Bonding: Formation of ionic bonds, factors affecting the formation of ionic bonds; calculation of lattice enthalpy.

Covalent Bonding: Concept of electronegativity, Fajan's rule, dipole moment; Valence Shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules (Linear, Angular, Triangular, Square Planer and Pyramidal).

Quantum mechanical approach to covalent bonding:

Valence bond theory – Its important features, concept of hybridization involving s, p and d orbitals; Resonance.


UNIT 5: CHEMICAL THERMODYNAMICS

Fundamentals of thermodynamics: System and surroundings, extensive and intensive properties, state functions, types of processes.

First law of thermodynamics - Concept of work, heat internal energy and enthalpy, heat capacity, molar heat capacity; Hess's law of constant heat summation; Enthalpies of bond dissociation, combustion, formation, atomization, sublimation, phase transition, hydration, ionization and solution.

Second law of thermodynamics - Spontaneity of processes; S of the universe and G of the system as criteria for spontaneity, G (Standard Gibbs energy change) and equilibrium constant. UNIT 6: SOLUTIONS
SRK University

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 solutions – relative lowering of vapour pressure, depression of freezing point, elevation of boiling point and osmotic pressure; Determination of molecular mass using colligative properties; Abnormal value of molar mass, van't Hoff factor and its significance.

UNIT 7: EQUILIBRIUM

Meaning of equilibrium, concept of dynamic equilibrium.

Equilibria involving physical processes: Solid – liquid, liquid – gas and solid gas equilibria, Henry's law, general characteristics of equilibrium involving physical processes.

Equilibria involving chemical processes: Law of chemical equilibrium, equilibrium constants (Kp and Kc) and their significance, significance of G and G in chemical equilibria, factors affecting equilibrium concentration, pressure, temperature, effect of catalyst; Le Chatelier's principle.

Ionic equilibrium: Weak and strong electrolytes, ionization of electrolytes, various concepts of acids and bases (Arrhenius, Bronstead – 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: REDOX REACTIONS AND ELECTROCHEMISTRY

Electronic concepts of oxidation and reduction, redox reactions, oxidation number, rules for assigning oxidation number, balancing of redox reactions. Electrolytic and metallic conduction, conductance in electrolytic solutions, specific 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; Relationship between cell potential and Gibbs' energy change; Corrosion and its prevention.

UNIT 9: CHEMICAL KINETICS

Rate of a chemical reaction, factors affecting the rate of reactions: concentration, temperature, pressure and catalyst; elementary and complex reactions, order and molecularity of reactions, rate law, rate constant and its units, differential and integral forms of zero and first order reactions, their characteristics and half – lives, effect of temperature on rate of reactions Arhenius theory, activation energy and its calculation, collision theory of bimolecular gaseous reactions (no derivation).

UNIT 10: SURFACE CHEMISTRY


INORGANIC CHEMISTRY

UNIT 11: CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES
Modern periodic law and present form of the periodic table, s, p, d and f block elements, periodic trends in properties of elements atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states and chemical reactivity.

UNIT 12: GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF METALS

Modes of occurrence of elements in nature, minerals, ores; Steps involved in the extraction of metals – concentration, reduction (chemical and electrolytic methods) and refining with special reference to the extraction of Al, Cu, Zn and Fe; Thermodynamic and electrochemical principles involved in the extraction of metals.

UNIT 13: HYDROGEN

Position of hydrogen in periodic table, isotopes, preparation, properties and uses of hydrogen; Physical and chemical properties of water and heavy water; Structure, preparation, reactions and uses of hydrogen peroxide; Classification of hydrides – ionic, covalent and interstitial; Hydrogen as a fuel.

UNIT 14: S – BLOCK ELEMENTS (ALKALI AND ALKALINE EARTH METALS)

Group – 1 and 2 Elements General introduction, electronic configuration and general trends in physical and chemical properties of elements, anomalous properties of the first element of each group, diagonal relationships. Preparation and properties of some important compounds – sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogen carbonate; Industrial uses of lime, limestone, Plaster of Paris and cement; Biological significance of Na, K, Mg and Ca.

UNIT 15: P – BLOCK ELEMENTS Group – 13 to Group 18 Elements

General Introduction: Electronic configuration and general trends in physical and chemical properties of elements across the periods and down the groups; unique of the first element in each group.

Groupwise study of the p block elements Group 13
Preparation, properties and uses of boron and aluminium; Structure, properties and uses of borax, boric acid, diborane, boron trifluoride, aluminium chloride and alums.

Group 14
Tendency for catenation; Structure, properties and uses of allotropes and oxides of carbon, silicon tetrachloride, silicates, zeolites and silicones.

Group 15
Properties and uses of nitrogen and phosphorus; Allotropic forms of phosphorus; Preparation, properties, structure and uses of ammonia, nitric acid, phosphine and phosphorus halides, (PCI3, PCI); Structures of oxides and oxoacids of nitrogen and phosphorus.

Group 16
Preparation, properties, structures and uses of dioxygen and ozone; Allotropic forms of sulphur; Preparation, properties, structures and uses of sulphur dioxide, sulphuric acid (including its industrial preparation); Structures of oxoacids of sulphur.

Group 17
Preparation, properties and uses of chlorine and hydrochloric acid; Trends in the acidic nature of hydrogen halides; Structures of Interhalogen compounds and oxides and oxoacids of halogens.
Occurrence and uses of noble gases; Structures of fluorides and oxides of xenon. UNIT 16: d– and f–BLOCK ELEMENTS

Transition Elements

General introduction, electronic configuration, occurrence and characteristics, general trends in properties of the first row transition elements – physical properties, ionization enthalpy, oxidation states, atomic radii, colour, catalytic, magnetic properties, complex formation, interstitial compounds, alloy formation; Preparation, properties and uses of K₂Cr₂O₇ and KMnO₄.

UNIT 17: CO-ORDINATION COMPOUNDS

Introduction to co-ordination compounds, Werner's theory; ligands, co-ordination number, denticity, chelation; IUPAC nomenclature of mononuclear coordination compounds, isomerism; Bonding-Valence bond approach and basic ideas of Crystal field theory, colour and magnetic properties; Importance of coordination compounds (in qualitative analysis, extraction of metals and in biological systems).

ORGANIC CHEMISTRY

UNIT 18: PURIFICATION AND CHARACTERISATION OF ORGANIC COMPOUNDS

Purification – Crystallization, sublimation, distillation, differential extraction and chromatography – principles and their applications.

Qualitative analysis – Detection of nitrogen, sulphur, phosphorus and halogens.

Quantitative analysis (basic principles only) – Estimation of carbon, hydrogen, nitrogen, halogens, sulphur, phosphorus. Calculations of empirical formulae and molecular formulae; Numerical problems in organic quantitative analysis.

UNIT 19: SOME BASIC PRINCIPLES OF ORGANIC CHEMISTRY

Tetravalency of carbon; Shapes of simple molecules – hybridization (s and p); Classification of organic compounds based on functional groups: -C = C-, -C-H-C- and those containing halogens, oxygen, nitrogen and sulphur; Homologous series; Isomerism – structural and stereoisomerism.

Nomenclature (Trivial and IUPAC)

Covalent bond fission – 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.

Common types of organic reactions – Substitution, addition, elimination and rearrangement. UNIT 20: HYDROCARBONS

Classification, isomerism, IUPAC nomenclature, general methods of preparation, properties and reactions.

Alkanes – Conformations: Sawhorse and Newman projections (of ethane); Mechanism of halogenations of alkanes.

Alkenes – Geometrical isomerism; Mechanism of electrophilic addition: addition of hydrogen, halogens, water, hydrogen halides (Markownikoff's and peroxide effect); Ozonolysis, oxidation, and polymerization.

Alkynes – Acidic character; Addition of hydrogen, halogens, water and hydrogen halides; Polymerization.

UNIT 21: ORGANIC COMPOUNDS CONTAINING HALOGENS

General methods of preparation, properties and reactions; Nature of C-X bond; Mechanisms of substitution reactions.
Uses; Environmental effects of chloroform, iodoform, freons and DDT.

UNIT 22: ORGANIC COMPOUNDS CONTAINING OXYGEN

General methods of preparation, properties, reactions and uses.

ALCOHOLS, PHENOLS AND ETHERS

Alcohols: Identification of primary, secondary and tertiary alcohols; mechanism of dehydration.
Ethers: Structure.
Aldehydes and Ketones: Nature of carbonyl group; Nucleophilic addition to >C=O group, relative reactivities of aldehydes and ketones; Important reactions such as Nucleophilic addition reactions (addition of HCN, NH₃ and its derivatives), Grignard reagent; oxidation; reduction (Wolff Kishner and Clemmensen); acidity of α-hydrogen, aldol condensation, Cannizzaro reaction, Haloform reaction; Chemical tests to distinguish between aldehydes and Ketones.

CARBOXYLIC ACIDS

Acidic strength and factors affecting it.

UNIT 23: ORGANIC COMPOUNDS CONTAINING NITROGEN

General methods of preparation, properties, reactions and uses.

Amines: Nomenclature, classification, structure, basic character and identification of primary, secondary and tertiary amines and their basic character.
Diazonium Salts: Importance in synthetic organic chemistry.

UNIT 24: POLYMERS

General introduction and classification of polymers, general methods of polymerization-addition and condensation, copolymerization; Natural and synthetic rubber and vulcanization; some important polymers with emphasis on their monomers and uses – polythene, nylon, polyester and ibberel.

UNIT 25: BIOMOLECULES

General introduction and importance of biomolecules.

CARBOHYDRATES – Classification: aldoses and ketoses; monosaccharides (glucose and fructose), constituent monosaccharides of oligosaccharides (sucrose, lactose, maltose) and polysaccharides (starch, cellulose, glycogen).

PROTEINS – Elementary Idea of α-amino acids, peptide bond, polypeptides; Proteins: primary structure (qualitative idea only), denaturation of proteins, enzymes.

UNIT 26: PRINCIPLES RELATED TO PRACTICAL CHEMISTRY

Detection of extra elements (N, S, halogens) in organic compounds; Detection of the following functional groups: hydroxyl (alcoholic and phenolic), carbonyl (aldehyde and ketone), carboxyl and amino groups in organic compounds.
Chemistry involved in the preparation of the following: Inorganic compounds: Mohr's salt, potash alum. Organic compounds: Acetanilide, pnitroacetanilide, aniline yellow, iodoform.

Chemistry involved in the titrimetric exercises – Acids bases and the use of indicators, oxalic-acid vs KmnO4, Mohr's salt vs KmnO4.

Chemical principles involved in the qualitative salt analysis:
Cations – Pb , Cu , Al , Fe, Zn, Ni, Ca, Ba, Mg, NH. Anions- CO , S, SO , NO-, NO, Cl-, Br-, I-. (Insoluble salts excluded).

MATHEMATICS

UNIT 1 : SETS, RELATIONS AND FUNCTIONS
Sets and their representation; Union, Intersection and Complement of sets and their algebraic properties; Power set; Relation, Types of relations, Equivalence relations, functions; one-one, into and onto functions, composition of functions.

UNIT 2 :COMPLEX NUMBERS AND QUADRATIC EQUATIONS
Complex numbers as ordered pairs of reals, Representation of complex numbers in the form a+ib and their representation in a plane, Argand diagram, Algebra of complex numbers, Modulus and Argument (or Amplitude) of a complex number, square root of a complex number, triangle inequality, Quadratic equations in real and complex number system and their solutions. Relation between roots and co-efficients, nature of roots, formation of quadratic equations with given roots.

UNIT 3 :MATRICES AND DETERMINANTS
Matrices, Algebra of matrices, Types of matrices, Determinants and matrices of order two and three. Properties of determinants, Evaluation of determinants, Area of triangles using determinants. Adjoint and evaluation of inverse of a square matrix using determinants and elementary transformations, Test of consistency and solution of simultaneous linear equations in two or three variables using determinants and matrices.

UNIT 4 :PERMUTATIONS AND COMBINATIONS
Fundamental principle of counting, permutation as an arrangement and combination as selection, Meaning of P(n,r) and C (n,r), simple applications.

UNIT 5 :MATHEMATICAL INDUCTION
Principle of Mathematical Induction and its simple applications.

UNIT 6 :BINOMIAL THEOREM AND ITS SIMPLE APPLICATIONS
Binomial theorem for a positive integral index, general term and middle term, properties of Binomial coefficients and simple applications.

UNIT 7 : SEQUENCES AND SERIES

UNIT 8 : LIMIT, CONTINUITY AND DIFFERENTIABILITY
Real – valued functions, algebra of functions, polynomials, rational, trigonometric, logarithmic and exponential functions, inverse functions. Graphs of simple functions. Limits, continuity and differentiability. Differentiation of the sum, difference, product and quotient of two functions. Differentiation of trigonometric, inverse trigonometric, logarithmic, exponential, composite and implicit functions; derivatives of order upto two. Rolle's and Lagrange's
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Mean Value Theorems. Applications of derivatives: Rate of change of quantities, monotonic – increasing and decreasing functions, Maxima and Minima of functions of one variable, Tangents and Normals.

UNIT 9 : INTEGRAL CALCULUS

Integral as an anti – derivative. Fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution, by parts and by partial fractions. Integration using trigonometric identities.


UNIT 10 : DIFFERENTIAL EQUATIONS

Ordinary differential equations, their order and degree. Formation of differential equations. Solution of differential equations by the method of separation of variables, solution of homogeneous and linear differential equations of the type:

UNIT 11: CO-ORDINATE GEOMETRY

Cartesian system of rectangular co-ordinates in a plane, distance formula, section formula, locus and its equation, translation of axes, slope of a line, parallel and perpendicular lines, intercepts of a line on the coordinate axes.

Straight lines

Various forms of equations of a line, intersection of lines, angles between two lines, conditions for concurrence of three lines, distance of a point from a line, equations of internal and external bisectors of angles between two lines, coordinates of centroid, and circumcentre of a triangle, equation of family of lines passing through the point of intersection of two lines.

Circles, conic sections

Standard form of equation of a circle, general form of the equation of a circle, its radius and centre, equation of a circle when the end points of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be tangent to a circle, equation of the tangent. Sections of cones, equations of conic sections (parabola, ellipse and hyperbola) in standard forms, condition for $y = mx + c$ to be a tangent and point (s) of tangency.

UNIT 12: THREE DIMENSIONAL GEOMETRY

Coordinates of a point in space, distance between two points, section formula, direction ratios and direction cosines, angle between two intersecting lines. Skew lines, the shortest distance between them and its equation. Equations of a line and a plane in different forms, intersection of a line and a plane, coplanar lines.

UNIT 13: VECTOR ALGEBRA

Vectors and scalars, addition of vectors, components of a vector in two dimensions and three dimensional space, scalar and vector products, scalar and vector triple product.

UNIT 14: STATISTICS AND PROBABILITY

Measures of Dispersion: Calculation of mean, median, mode of grouped and ungrouped data. Calculation of standard deviation, variance and mean deviation for grouped and ungrouped data.

Probability: Probability of an event, addition and multiplication theorems of probability, Baye's theorem, probability distribution of a random variate, Bernoulli trials and Binomial distribution.

UNIT 15: TRIGONOMETRY

Trigonometrical identities and equations. Trigonometrical functions. Inverse trigonometrical functions and their properties. Heights and Distances.
UNIT 16: MATHEMATICAL REASONING:
Statements, logical operations AND, OR, IMPLIES, IMPLIED BY, IF AND ONLY IF. Understanding of Tautology, Contradiction, Converse and Contrapositive.

BIOLOGY

UNIT I: DIVERSITY OF LIVING ORGANISM

What is living? Biodiversity; Need for classification; Three domain of life; Taxonomy & Systematics; Concept of species and taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy-Museums, Zoos, Herbaria, Botanical gardens. Five kingdom classification; Salient features and classification of Monera; Protista and Fungi into major groups; Lichens; Viruses and Viroids. Salient features and classification of plants into major groups-Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms (three to five salient and distinguishing features and at least two examples of each category); Angiosperms – classification up to class, characteristic features and examples. Salient features and classification of animals-non chordate up to phyla level and chordate up to classes level (three to five salient features and at least two examples).

UNIT II: STRUCTURAL ORGANISATION IN ANIMALS AND PLANTS

Morphology and modifications; Tissues; Anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence-cymose and racemose, flower, fruit and seed (To be dealt along with the relevant practical of the Practical Syllabus). Animal tissues; Morphology, anatomy and functions of different system (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach). (a brief account only)

UNIT III: CELL STRUCTURE AND FUNCTION

Cell theory and cell as the basic unit of life; Structure of prokaryotic and eukaryotic cell; Plant cell and animal cell; Cell envelope, cell membrane, cell wall; Cell organelles – structure and function; Endomembrane system-endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, microbodies; Cytoskeleton, cilia, flagella, centrioles (ultra structure and function); Nucleus-nuclear membrane, chromatin, nucleous. Chemical constituents of living cells: Biomolecules-structure and function of proteins, carbohydrates, lipid, nucleic acids, Enzymes-types, properties, enzymes action. Cell division : Cell cycle, mitosis, meiosis and their significance.

UNIT IV: PLANT PHYSIOLOGY

Transport in plants: Movement of water, gases and nutrients; Cell to cell transport-Diffusion, facilitated diffusion, active transport; Plant-water relations-Imbibition, water potential, osmosis, plasmolysis; Long distance transport of water-Absorption, apoplastic, symplastic, transpiration pull, root pressure and guttation; Transpiration-Opening and closing of stomata; Uptake and translocation of mineral nutrients-Transport of food, phloem transport, Mass flow hypothesis; Diffusion of gases (brief mention). Mineral nutrition: Essential minerals, macro and micronutrients and their role; Deficiency symptoms; Mineral toxicity; elementary idea of Hydroponics as a method to study mineral nutrition; Nitrogen metabolism-Nitrogen cycle, biological nitrogen fixation.

Photosynthesis: Photosynthesis as a means of Autotrophic nutrition; Where does photosynthesis take place, How many pigments are involved in Photosynthesis (Elementary idea); Photochemical and biosynthetic phases of photosynthesis; Cyclic and non cyclic photophosphorylation; Chemiosmotic hypothesis; Photorespiration; C3 and C4 pathways; factors affecting photosynthesis.
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Respiration: Exchange of gases; Cellular respiration – glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); Energy relations-Number of ATP molecules generated; Amphibolic pathways; Respiratory quotient.

Plant growth and development: Seed germination; Phases of plant growth and plant growth rate; Conditions of growth; Differentiation, dedifferentiation and redifferentiation; sequence of developmental process in a plant cell; Growth regulators- auxin, , cytokinin, ethylene, ABA; Seed dormancy; Vernalisation: Photoperiodism.

UNIT V: HUMAN PHYSIOLOGY

Digestion and absorption: Alimentary canal and digestive glands, Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; Calorific value of proteins, carbohydrates and fat (for box item not to be evaluated); Egestion; Nutritional and digestive disorders- PEM, indigestion, constipation, vomiting, jaundice, diarrhea.

Breathing and Respiration: Respiratory organs in animals (recall only); Respiratory system in humans; Mechanism of breathing and its regulation in humans-Exchange of gases, transport of gases and regulation of respiration, Respiratory volume. Disorders related to respiration-Asthma, Emphysema, Occupacional respiratory disorders.

Body fluids and circulation: Composition of blood, blood groups, coagulation of blood; Composition of lymph and its function; Human circulatory system-Structure of human heart and blood vessels; Cardiac cycle, cardiac output, ECG; Double circulation; Regulation of cardiac activity; Disorders of circulatory system-Hypertension, Coronary artery disease, Angina pectoris, Heart failure.

Excretory products and their elimination: Modes of excretion – Ammonotelism, ureotelism, uricotelism; Human excretory system-structure and function; Urine formation, Osmoregulation; Regulation of kidney function-Renin-angiotensin, Atrial Natriuretic Factor, ADH and Diabetes insipidus; Role of other organs in excretion; Disorders-Uraemia, Renal failure, Renal calculi, Nephritis; Dialysis and artificial kidney.

Locomotion and Movement: Types of movement – ciliary, flagellar, muscular; Skeletal muscle-contractile proteins and muscle contraction; Skeletal system and its functions (To be dealt with the relevant practical of Practical syllabus); Joints; Disorders of muscular and skeletal system – Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis, Gout.

Neural control and coordination: Neuron and nerves; Nervous system in humans-central nervous system & peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse; Reflex action; Sensory perception; Sense organs; Elementary structure and function of eye and ear.

Chemical coordination and regulation: Endocrine glands and hormones; Human endocrine system-Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Mechanism of hormone action (Elementary Idea); Role of hormones as messengers and regulators, Hypo-and hyperactivity and related disorders (Common disorders e.g. Dwarfism, Acromegaly, Cretinism, goiter, exphalamic goiter, diabetes, Addison's disease).

Reproduction

Reproduction in organisms: Reproduction, a characteristic feature of all organisms for continuation of species; Modes of reproduction-A sexual and sexual reproduction; Modes- Binary fission, sporulation, budding, gemmule, fragmentation; vegetative propagation in plants.

Sexual reproduction in flowering plant: Flower structure; Development of male and female gametocytes; Pollination-types, agencies and examples; Oobreedings devices; Pollen- Pistil interaction; Double fertilization; Post fertilization events-Development of endosperm and embryo, Development of seed and formation of fruit; Special modes-apomixis, parthenocarpy, polyembryony; Significance of seed and fruit formation. Human Reproduction: Male and female reproductive systems; Microscopic anatomy of testis and ovary; Gametogenesis-spermatogenesis &
oogenesis; Menstrual cycle; Fertilisation embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elementary idea).
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