



AIEEE (All India Engineering/ Pharmacy/ Architecture Entrance Examination)

Introduction:

An All-India Engineering/Pharmacy/Architecture Entrance Examination (AIEEE) is conducted by CBSE, Department of Secondary and Higher Education, Ministry of Human Resource Development in compliance with the directives of the Government of India, for admission to degree level courses in Engineering, Pharmacy and Architecture in Central Universities, National Institutes of Technology, Deemed Universities and Institutions in the States/UTs other than those covered by Joint Entrance Examination/State Level Entrance Examination for paid or unpaid seats based on the score.

Eligibility

Educational Qualification : The minimum academic qualification for admission through AIEEE is a pass in 10+2 (senior secondary Class XII) examination or its equivalent referred to as the qualifying examination from a recognized Board/University. Those appearing in 10+2 final or equivalent examination may also appear in AIEEE for consideration of provisional admission. Admission to AIEEE is meant for Indian nationals only.

Age Limit : Candidates between 16-24 years of age on the first day of October of the year of admission below 25 years at the time of admission are eligible. In the case of SC, ST and PH candidates, upper age limit is relaxed by 5 years. Date of birth as recorded in the Secondary Education Board/University certificate only will be taken as authentic.

Selection : On the basis of performance in AIEEE, separate rank lists will be prepared for B.E./B.Tech., B.Pharm and B.Arch/B.Planning. Score Card indicating All India Rank with total marks and marks in each subject shall be sent to all candidates appearing in AIEEE. Candidates scoring above a certain cut off percentage of marks (being different for General and SC/ST/PH category candidates) to be called for counselling shall be determined at the time of declaration of AIEEE results. All India Rank and marks shall also be released on AIEEE

website www.aieee.nic.in

Admission Procedure

Information Bulletin-cum-Application form can be procured by post only from the AIEEE Unit, at the Central Board or Secondary Education 17-B, I.P. Estate, New Delhi - 110 002 or personally from Regional Offices of CBSE and Designated Branches of Syndicate Bank/Designated Institutions. The Syndicate Bank will not send the Information Bulletin by Post.

The cost of information Bulletin inclusive of Examination Fee is Rs.300/- for General Category and Rs.150/- for SC and ST candidates.

To obtain information Bulletin-cum-Application form by post candidates should send their request to the Asstt. Secretary AIEEE Unit, Central Board of Secondary Education, 17-B Indraprastha Estate New Delhi - 110 002 along with a bank draft for Rs.350/- only (Rs.200/- only for SC/ST

candidates) payable in favour of The Secretary, CBSE at New Delhi and a self addressed envelope of 12" x 10". This includes Rs.50/- only towards postal charges

Online submission of application with photograph and signature on Computer Printed Form generated and down loaded from the website and to be sent by Registered/Sped Post to CBSE and payment made (a) Bank Draft, or (b) Syndicate Bank AIEEE Challan Form, generated at the time of submission of particulars are down loaded from the website, in any branch across the country

Candidates are required to retain a print copy of application form, number, date, the mode of remittance of Examination fee and the copy of the Bank Draft/Syndicate Bank AIEEE Challan. In addition to Examination Fee, following Service/ Processing Charges will have to be paid by the candidates.

The application form duly filled-in along with other documents, if any, should be sent by Registered/Speed Post to The Asstt. Secretary, AIEEE unit, Central board of secondary education, 17-b, Indraprastha Estate, New Delhi - 110002.

The last date for receipt of application form by Registered/Speed Post is tentatively First week of February. Thereafter 15 days grace time will be allowed to the candidates belonging to remote areas viz. Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Lahaul and Spiti District and Pangi sub division of Chamba District of Himachal Pradesh, Andaman & Nicobar Islands and Lakshadweep.

SYLLABUS:

MATHEMATICS:

Algebra

Sets, Relations and Functions : Sets and their Representations, Union, intersection and complements of sets, and their algebraic properties, Relations, equivalence relations, mappings, one-one, into and onto mappings, composition of mappings.>

Complex Numbers : 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. Cube roots of unity, triangle inequality.

Matrices and Determinants : Determinants and matrices of order two and three, properties of determinants, Evaluation of determinants. Area of triangles using determinants, Addition and multiplication of matrices, adjoint and inverse of matrix. Test of consistency and solution of simultaneous linear equations using determinants and matrices.

Quadratic Equations : 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; Symmetric functions of roots, equations reducible to quadratic equations application to practical problems

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. Mathematical Induction and Its applications

Binomial Theorem and its Applications : Binomial Theorem for a positive integral index; general term and middle term; Binomial Theorem for any index. Properties of Binomial Co-efficients. Simple applications for approximations.

Sequences and Series : Arithmetic, Geometric and Harmonic progressions. Insertion of Arithmetic Geometric and Harmonic means between two given numbers. Relation between A.M., G.M. and H.M. Special series: Σn , Σn^2 , Σn^3 . Arithmetico-Geometric Series, Exponential and Logarithmic series.

Calculus

Differential Calculus : Polynomials, rational, trigonometric, logarithmic and exponential functions, Inverse functions. Graphs of simple functions. Limits, Continuity; 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 up to two. Applications of derivatives: Rate of change of quantities, monotonic - increasing and decreasing functions, Maxima and minima of functions of one variable, tangents and normals, Rolle's and Lagrange's Mean Value Theorems.

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. Integral as limit of a sum. Properties of definite integrals. Evaluation of definite integrals; Determining areas of the regions bounded by simple curves.

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, and those of the type $d^2y/dx^2 = f(x)$

Two and Three Dimensional Geometry

Two dimensional Geometry : Recall of Cartesian system of rectangular co-ordinates in a plane, distance formula, area of a triangle, condition for the collinearity of three points and section formula, centroid and in-centre of a triangle, locus and its equation, translation of axes, slope of a line, parallel and perpendicular lines, intercepts of a line on the coordinate axes.

The straight line and pair of 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, orthocentre and circumcentre of a triangle, equation of family of lines passing through the point of intersection of two lines, homogeneous equation of second degree in x and y, angle between pair of lines through the origin, combined equation of the bisectors of the angles between a pair of lines, condition for the general second degree equation to represent a pair of lines, point of intersection and angle between two lines represented by $S=0$ and the factors of S.

Circles and Family of Circles : Standard form of equation of a circle, general form of the equation of a circle, its radius and centre, equation of a circle in the parametric form, 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 the circle, length of the tangent, equation of the tangent, equation of a family of circles through the intersection of two circles, condition for two intersecting circles to be orthogonal.

Conic Sections : 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.

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, equation of a sphere, its centre and radius. Diameter form of the equation of a sphere.

Vectors

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. Application of vectors to plane geometry.

Statistics

Measures of Central Tendency and Dispersion : Calculation of Mean, median and 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 and their applications; Conditional probability; Bayes' Theorem, Probability distribution of a random variate; Binomial and Poisson distributions and their properties.

Trigonometry : Trigonometrical identities and equations. Inverse trigonometric functions and their properties. Properties of triangles, including centroid, incentre, circum- centre and orthocentre, solution of triangles. Heights and Distances

Statics and Dynamics

Statics : Introduction, basic concepts and basic laws of mechanics, force, resultant of forces acting at a point, parallelogram law of forces, resolved parts of a force, Equilibrium of a particle under three concurrent forces, triangle law of forces and its converse, Lami's theorem and its converse, Two parallel forces, like and unlike parallel forces, couple and its moment.

Dynamics : Speed and velocity, average speed, instantaneous speed, acceleration and retardation, resultant of two velocities. Motion of a particle along a line, moving with constant acceleration. Motion under gravity. Laws of motion, Projectile motion.

Physics

PHYSICS

Units and Measurement : Units for measurement, system of units S.I., fundamental and derived units. Dimensions and their applications.

Description of Motion in One Dimension : Motion in a straight line, uniform and non-uniform motion, their graphical representation. Uniformly accelerated motion, and its applications

Description of Motion in two and three dimensions : Scalars and vectors, vector addition, a real number, zero vector and its properties. Resolution of vectors. Scalar and vector products, uniform circular motion and its applications projectile motion.

Laws of motion : Force and inertia Newton 's Laws of Motion. Conservation of linear momentum and its applications, rocket propulsion, friction laws of friction

Work, Energy and Power : Concept of work, energy and power. Energy kinetic and potential. Conservation of energy and its applications, Elastic collisions in one and two dimensions. Different forms of energy.

Rotational Motion and Moment of Inertia : Centre of mass of a two-particle system. Centre of mass of a rigid body, general motion of a rigid body, nature of rotational motion, torque, angular momentum, its conservation and applications. Moment of Inertia, parallel and perpendicular axes theorem, expression of moment of inertia for ring, disc and sphere.

Gravitation : Acceleration due to gravity, one and two-dimensional motion under gravity. Universal law of gravitation, variation in the acceleration due to gravity of the earth. Planetary motion, Kepler's laws, artificial satellite geostationary satellite, gravitational potential energy near the surface of earth, gravitational potential and escape velocity.

Properties of Matter : Inter-atomic and Inter-molecular forces, states of matter.

(A) Solids : Elastic properties, Hook's law, Young's modulus, bulk modulus, modulus of rigidity.

(B) Liquids : Cohesion and adhesion. Surface energy and surface tension. Flow of fluids, Bernoulli's theorem and its applications. Viscosity, Stoke's Law, terminal velocity.

Oscillations : Periodic motion, simple harmonic motion and its equation of motion, energy in S.H.M., Oscillations of a spring and simple pendulum.

Waves : Wave motion, speed of a wave, longitudinal and transverse waves, superposition of waves, progressive and standing waves, free and forced Oscillations, resonance, vibration of strings and air-columns, beats, Doppler effect.

Heat and Thermodynamics : Thermal expansion of solids, liquids and gases and their specific heats, Relationship between C_p and C_v for gases, first law of thermodynamics, thermodynamic processes. Second law of thermodynamics, Carnot cycle, efficiency of heat engines.

Transference of Heat : Modes of transference of heat. Thermal conductivity. Black body radiations, Kirchoff's Law, Wien's law, Stefan's law of radiation and Newton's law of cooling.

Electrostatics : Electric charge its unit and conservation, Coulomb's law, dielectric constant, electric field, lines of force, field due to dipole and its behaviour in a uniform electric field, electric flux, Gauss's theorem and its applications. Electric potential, potential due to a point charge. Conductors and insulators, distribution of charge on conductors. Capacitance, parallel plate capacitor, combination of capacitors, energy of capacitor, Van de Graff generator

Current Electricity : Electric current and its unit, sources of energy, cells- primary and secondary, grouping of cells resistance of different materials, temperature dependence, specific resistivity, Ohm's law, Kirchoff's law, series and parallel circuits. Wheatstone Bridge with their applications and potentiometer with their applications.

Thermal and Chemical Effects of Currents : Heating effects of current, electric power, simple concept of thermo-electricity Seebeck effect and thermocouple, Chemical effect of current Faraday's laws of electrolysis.

Magnetic Effects of Currents : Oersted's experiment, Biot-Savart's law (magnetic field due to a current element), magnetic field due to a straight wire, circular loop and solenoid, force on a moving charge in a uniform magnetic field (Lorentz force), forces and torques on currents in a magnetic field, force between two current carrying wires, moving coil galvanometer, ammeter and voltmeter.

Magnetostatics : Bar magnet, magnetic field, lines of force, torque on a bar magnet in a magnetic field, earth's magnetic field, tangent galvanometer, vibration magnetometer, para, dia and ferro-magnetism, magnetic induction, magnetic susceptibility.

Electromagnetic Induction and Alternating Currents : Induced e.m.f., Farady's Law, Lenz's Law, self and mutual induction, alternating currents, impedance and reactance, power in a.c. circuits, LCR series combination, resonant circuits. Transformer, simple motor, and A.C. generator.

Ray Optics : Sources of light, luminous intensity, luminous flux, illuminance and photometry (elementary idea). Reflection and refraction of light at plane and curved surfaces, total internal reflection, optical fibre, deviation and dispersion of light by a prism; Lens formula, magnification and resolving power; microscope and telescope.

Wave Optics : Wave nature of light; Interference Young's double slit experiment. Diffraction due to a single slit. Elementary idea of polarization, Doppler effect of light.

Electromagnetic waves : Electromagnetic oscillations. Electromagnetic wave spectrum from gamma to radio waves - their use and propagation, properties of the atmosphere w.r.t. electromagnetic spectrum.

Electrons and Photons : Discovery of electrons, cathode rays, charge on an electron, e/m for an electron, photoelectric effect and Einstein's equation of photoelectric effect.

Atoms, Molecules and Nuclei : Rutherford model of the atom, Bohr's model, energy quantizations, hydrogen spectrum, Atomic masses, size of the nucleus; Radioactivity; rays and their properties - alpha, beta and gamma decay; half life and mean life of radio-active nuclei, Binding energy, mass energy relationship, nuclear fission and nuclear fusion.

Solids and Semi-Conductor Devices : Energy bands in solids, conductors, insulators and semi-conductors, PN junction, diodes, diode as rectifier, junction transistor, transistor as an amplifier.

CHEMISTRY

Some Basic Concepts : Measurement in chemistry (significant figures, Dimensional analysis). Chemical classification of matter (mixtures, compounds and elements, and purification), Law of chemical combination and Dalton's Atomic theory, Atomic Mass (mole concept, determination of chemical formulae). Chemical equation (balancing of chemical equation and calculations using chemical equations).

States of Matter : Gaseous state (measurable properties of gases, Boyle's Law, Charles's Law and absolute scale of temperature, Avogadro's hypothesis, ideal gas equation, Dalton's law of partial pressure).

Kinetic molecular theory of gases (the microscopic model of gas, deviation from ideal behaviour).

The solid state (classification of solids, X-ray studies of crystal lattices and unit cells, packing of constituent particles in crystals). Liquid state (Properties of liquids, Vapour pressure, Surface tension, Viscosity).

Atomic Structures : Constituents of the atom (Discovery of electron, Rutherford model of the atom).

Electronic structure of atoms (nature of light and electromagnetic waves, atomic spectra. Bohr's model of Hydrogen atom. Quantum mechanical model of the atom, electronic configurations of atoms, Aufbau principle).

Dual nature of matter and radiation. de-Broglie relation. The uncertainty principle, Quantum Mechanical Model of the atom, Orbitals and Quantum numbers. Shapes of orbitals. Aufbau principle, Pauli Exclusion Principle, Hund's Rule, Electronic Configuration of atoms.

Solutions : Types of solutions, Vapour-pressure of solutions and Raoult's law. Colligative properties, Non-ideal solutions and abnormal molecular masses. Mole concept-stoichiometry, volumetric analysis-concentration unit.

Chemical Energetics and Thermodynamics : Energy changes during a chemical reaction, Internal energy and Enthalpy (Internal energy, Enthalpy, Enthalpy changes, Origin of Enthalpy change in a reaction, Hess's Law of constant heat summation, numericals based on these concepts). Heats of reactions (heat of neutralization, heat of combustion, heat of fusion and vaporization).

Sources of energy (conservation of energy sources and identification of alternative sources, pollution associated with consumption of fuels. The sun as the primary source).

First law of thermodynamics; Relation between Internal energy and Enthalpy, application of first law of thermodynamics.

Second law of thermodynamics : Entropy, Gibbs energy, Spontaneity of a chemical reaction, Gibbs energy change and chemical equilibrium, Gibbs energy available for useful work.

Chemical Equilibrium : Equilibria involving physical changes (solid-liquid, liquid-gas equilibrium involving dissolution of solid in liquids, gases in liquids, general characteristics of equilibrium involving physical processes)

Equilibria involving chemical systems (the law of chemical equilibrium, the magnitude of the equilibrium constant, numerical problems).

Effect of changing conditions of systems at equilibrium (change of concentration, change of temperature, effect of catalyst-Le Chatelier's principle).

Equilibria involving ions (ionization of electrolytes, weak and strong electrolytes, acid-base equilibrium, various concepts of acids and bases, ionization of water, pH, solubility product, numericals based on these concepts).

Redox Reactions and Electrochemistry : Oxidation and reduction as an electron transfer process. Redox reactions in aqueous solutions-electrochemical cells. EMF of a galvanic cell. Dependence of EMF on concentration and temperature (nearest equation and numerical problems based on it). Electrolysis, Oxidation numbers (rules for assigning oxidation number, redox reactions in terms of oxidation number and nomenclature). Balancing of oxidation-reduction equations.

Electrolytic conduction. Molar conductivity, Kohlrausch's Law and its applications, Voltaic cell, Electrode potential and Electromotive force, Gibb's energy change and cell potential. Electrode potential and products of electrolysis, Fuel cells, corrosion and its prevention.

Rates of Chemical Reactions and Chemical Kinetics : Rate of reaction, Instantaneous rate of reaction and order of reaction. 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, catalysis). Effect of light on rates of reactions. Elementary reactions as steps to more complex reactions. How fast are chemical reactions?

Rate law expression. Order of a reaction (with suitable examples). Units of rates and specific rate constants. Order of reaction and effect of concentration (study will be confined to first order only). Temperature dependence of rate constant Fast reactions (only elementary idea). Mechanism of reaction (only elementary idea). Photochemical reactions.

Surface Chemistry

Surfaces : Adsorption Physical and chemical adsorption, adsorption isotherms

Colloids : Preparation and general properties, Emulsions, Micelles

Catalysis : Homogeneous and heterogeneous, structure of catalyst, Enzymes, Zeolites

Chemical Families - Periodic Properties : Modern periodic law, Types of elements Representative elements (s & p block), Transition elements d-block elements, inner transition elements f-block elements). Periodic trends in properties ionization enthalpy, electron gain enthalpy, atomic radii, valence, periodicity in properties of compounds).

Chemical Bonding and Molecular structure : Chemical bonds and Lewis structure shapes of molecules (VSEPR theory). Quantum theory of the covalent bond (Hydrogen and some simple molecules, carbon compounds. Hybridization, Boron and Beryllium compounds).

Coordinate covalent bond (Ionic bond as an extreme case of polar covalent bond, ionic character of molecules and polar molecules. Bonding in solid state (Ionic, molecular and covalent solids, metals). Hydrogen bond, Resonance.

Molecules: Molecular orbital. Theory bond order and magnetic properties of H₂, O₂, N₂, F₂ on the basis of MOT. Hybridisation involving s, p and d orbitals (including shapes of simple organic molecules), Dipole moment and structure of molecules.

Chemistry of Non-metals-I

Hydrogen (unique position in periodic table, occurrence, isotopes, properties, reactions and uses), Hydrides molecular, soline and interstitial

Oxygen (occurrence, preparation, properties and reactions, uses), simple oxides; ozone

Water and hydrogen peroxide, structure of water molecule and its aggregates, physical and chemical properties of water, hard and soft water, water softening, hydrogen peroxide preparation, properties, structure and uses.

Nitrogen Preparation, properties, uses, compounds of Nitrogen Ammonia, Oxides of Nitrogen, Nitric Acid preparation, properties and uses.

Chemistry of Non-metals-II

Boron occurrence, isolation, physical and chemical properties, borax and boric acid, uses of boron and its compounds.

Carbon, inorganic compounds of carbon oxides, halides, carbides, elemental carbon.

Silicon occurrence, preparation and properties, oxides and oxyacids of phosphorus, chemical fertilizers.

Sulphur occurrence and extraction, properties and reactions, oxides, Sulphuric acid preparation, properties and uses, sodium thiosulphate.

Halogens occurrence, preparation, properties, hydrogen halides, uses of halogens.

Noble gases discovery, occurrence and isolation, physical properties, chemistry of noble gases and their uses.

Chemistry of lighter Metals

Sodium and Potassium occurrence and extraction, properties and uses. Important compounds NaCl, Na₂CO₃, NaHCO₃, NaOH, KCl, KOH.

Magnesium and calcium occurrence and extraction, properties and uses. Important compounds MgCl₂, MgSO₄, CaO, Ca(OH)₂, CaCO₃, CaSO₄, plaster of paris, Bleaching Powder.

Aluminium occurrence, extraction, properties and uses, compounds AlCl₃, alums. Cement.

Biological role of Sodium, Potassium, Magnesium and Calcium.

Chemistry of heavier Metals

Iron Occurrence and extraction, compounds of iron, oxides, halides, sulphides, sulphate, alloy and steel.

Copper and silver occurrence and extraction, properties and uses, compounds sulphides, halides and sulphates, photography.

Zinc and Mercury occurrence and extraction, properties and uses, compounds -oxides, halides; sulphides and sulphates

Tin and Lead occurrence and extraction, properties and uses, compounds oxides, sulphides, halides.

Chemistry of Representative Elements

Periodic properties - Trends in groups and periods (a) Oxides-nature (b) Halides-melting points (c) Carbonates and sulphates-solubility.

The chemistry of s and p block elements, electronic configuration, general characteristic properties and oxidation states of the following:-

Group 1 elements - Alkali metals

Group 2 elements - Alkaline earth metals

Group 13 elements - Boron family

Group 14 elements - Carbon family

Group 15 elements - Nitrogen family

Group 16 elements - Oxygen family

Group 17 elements - Halogen family

Group 18 elements - Noble gases and Hydrogen

Transition Metals including Lanthanides

Electronic configuration: General characteristic properties. States of transition metals. First row transition metals and general properties of their compounds - oxides, halides and sulphides.

General properties of second and third row transition elements (Groupwise discussion).

Preparation, properties and uses of Potassium dichromate, Potassium permanganate. Inner Transition Elements General discussion with special reference to oxidation states and lanthanide contraction.

Coordination Chemistry and Organometallics

Coordination compounds, Nomenclature : Isomerism in coordination compounds; Bonding in coordination compounds, Werner's coordination theory. Applications of coordination compounds.

Nuclear Chemistry

Nature of radiation from radioactive substances; Nuclear reactions; Radioactive disintegration series; Artificial transmutation of elements; Nuclear fission and Nuclear fusion; isotopes and their applications: Radio carbon-dating.

Purification and Characterisation of Organic Compounds

Purification (crystallization, sublimation, distillation, differential extraction, chromatography).

Qualitative analysis, detection of nitrogen, sulphur, phosphorus and halogens.

Quantitative analysis estimation of carbon, hydrogen, nitrogen, halogens, sulphur, phosphorus (basic principles only)

Determination of molecular mass Silver salt method, chloroplatinate salt method

Calculation of empirical formula and molecular formula.

Numerical problems in organic quantitative analysis, modern methods of structure elucidation.

Some Basic Principles

Classification of Organic Compounds.

Tetravalency of Carbon. Homologous series. Functional groups C = C, C C, and groups containing halogen, oxygen, nitrogen and sulphur. General introduction to naming organic compounds Common names and IUPAC nomenclature of aliphatic, aromatic and Cyclic Compounds. Illustration with examples of Compounds having not more than three same or different functional groups/atoms. Isomerism Structural and stereoisomerism (geometrical and optical). Chirality Isomerism in Compounds having one and two chiral Centres. Enantiomers, diastereoisomers, racemic forms, racemisation & resolution.

Covalent bond fission Homolytic and Heterolytic : free radicals carbocations and carbanions. Stability of Carbocations and free-radicals. Electrophiles and Nucleophiles.

Electron displacement in a covalent bond inductive effect, electromeric effect, resonance

Common types of organic reactions Substitution, addition, elimination and rearrangement reactions. Illustrations with examples.

Hydrocarbons

Classification. Sources of hydrocarbons:

Alkanes - General methods of preparation (from unsaturated hydrocarbons, alkylhalides, aldehydes, ketones and carboxylic acids). Physical properties and reactions (Substitution, oxidation and miscellaneous). Conformations of alkanes(ethane, propane butane) and cyclohexane, sawhorse and Newman projections) mechanism of halogenation of alkanes.

Alkanes and Alkynes - General methods of preparation physical properties, Chemical reactions Mechanism of electrophilic addition reactions in alkenes Markownikoff's Rule, peroxide effect. Acidic character of alkynes. Polymerisation of alkenes.

Aromatic hydrocarbons - Benzene and its homologues, Isomerism, Chemical reactions of benzene. Structure of benzene, resonance. Directive influence of substituents.

Petroleum - Hydrocarbons from Petroleum, Cracking and reforming, quality of gasoline Octane number, gasoline additives.

Organic Compounds Containing Halogens

(Haloalkanes and Haloarenes)

Methods of preparation, physical properties and reactions.

Preparation, properties and uses of Chloroform and Iodoform,

Organic compounds containing Oxygen

General methods of preparation, correlation of physical properties with their structures, chemical properties and uses of Alcohols, polyhydric alcohols, Ethers, aldehydes, ketones, carboxylic acids and their derivatives, Phenol, Benzaldehyde and Benzoic acid their important methods of

preparation and reactions. Acidity of carboxylic acids and phenol effect of substituents on the acidity of carboxylic acids.

Organic Compounds Containing Nitrogen

(Cyanides, isocyanides, nitrocompounds and amines)

Nomenclature and classification of amines, cyanides, isocyanides, nitrocompounds and their methods of preparation; correlation of their physical properties with structure, chemical reactions and uses Basicity of amines

Synthetic and Natural Polymers

Classification of Polymers, natural and synthetic polymers (with stress on their general methods of preparation) and important uses of the following:

Teflon, PVC, Polystyrene, Nylon-66, terylene

Environmental pollution - pollutants - services - check and alternatives.

Bio Molecules and Biological Processes

The Cell and Energy Cycle

Carbohydrates : Monosaccharides, Disaccharides, Polysaccharides

Amino Acides and Peptides - Structure and classification.

Proteins and Enzymes - Structure of Proteins, Role of enzymes.

Nucleic Acids - DNA and RNA

Biological functions of Nucleic acids - Protein synthesis and replication

Lipids - Structure, membranes and their functions.

Chemistry in Action

Dyes, Chemicals and medicines (antipyretic, analgesic, and tranquilisers), Rocket propellants.

(Structural formulae non-evaluative)

Environmental Chemistry

Environmental pollutants; soil, water and air pollution; major atmospheric pollutants; acid rain, Ozone and its reactions causing ozone layer depletion, effects of the depletion of ozone layer, industrial air pollution.

BIOLOGY(BOTANY&ZOOLOGY)

The Living World

Nature and scope of Biology, Methods of Biology. Our place in the universe. Laws that govern the universe and life levels of organization. Causes and effect relationship.

Being alive what it means? Present approach to understand life processes molecular approach; life as an expression of energy; steady state and homeostasis; self duplication and survival, adaptation; death as a positive part of life.

Origin of life and its maintenance. Origin and diversity of life. Physical and chemical principles that maintain life process, the living crust and interdependence. The positive and negative aspects of progress in biological sciences. The future of the living world, identification of human responsibility in shaping our future.

Unity of Life

Cell as unit of life. Small biomolecules; water, minerals, mono- and oligosaccharides, lipids, amino acids, nucleotides and their chemistry, cellular location and function. Macromolecules in cells their chemistry, cellular location and functional significance. Polysaccharides, proteins and nucleic acids. Enzymes; chemical nature, classification, mechanism in action-enzyme complex, allosteric modulation (brief), irreversible activation. Biomembranes. Fluid mosaic model of membrane in transport and recognition of external information (brief). Structural organisation of the cell; light and electron microscopic views of cell, its organelles and their functions; Nucleus, mitochondria, chloroplasts, endoplasmic reticulum. Golgi complex, Lysosomes, microtubules, cell wall, cilia and flagella, vacuoles, cell inclusions. A general account of cellular respiration. Fermentation, biological oxidation, mitochondrial electron transport chain, high energy bonds and oxidative phosphorylation, cell reproduction; Process of mitosis and meiosis.

Diversity of Life

Introduction : The enormous variety of living things, the need for classification to cope with this variety; taxonomy and phylogeny; shortcoming of a two kingdom classification as plants and animals; a five kingdom classification. Monera, Protista, Plantae, Fungi and Animalia. The basic features of five kingdom classification; modes of obtaining nutrition autotrophs and heterotrophs. Life styles: producers, consumers and decomposers, Unicellularity and multicellularity, phylogenetic relationships. Concepts of species, taxon and categories-hierarchical levels of classification; binomial nomenclature; principles of classification and nomenclature; identification and nature of viruses and bacteriophages and organisms. Kingdom Monera-archaea-bacteria-life in extreme environments; Bacteria, actinomycetes, Cyanobacteria. Example to illustrate autotrophic and heterotrophic life style; mineralizer-nitrogen fixers; Monera in cycling matter; symbiotic forms; disease producers. Kingdom Protista-Eucaryotic unicellular organisms; development of flagella and cilia; beginning of mitosis; syngamy and sex. Various life styles shown in the major phyla. Evolutionary precursors of complex life forms. Diatoms, dinoflagellates, slime moulds, protozoan, symbiotic forms. Plant kingdom-complex autotrophs, red, brown and green algae; conquest of land, bryophytes, ferns, gymnosperms and angiosperms Vascularization; development of flower, fruit and seed. Kingdom fungi-lower fungi (Zygomycetes) higher fungi (Ascomycetes and Basidiomycetes); the importance of fungi, Decomposers; parasitic forms; lichens and mycorrhizae, animal kingdom-animal body pattern and symmetry. The development of body cavity in invertebrate vertebrate phyla. Salient feature with reference to habitat and examples of phylum porifera, coelenterata, helminths, annelids, mollusca, arthropoda, enchinoderms; chordata (classes fishes, amphibians, reptiles, birds and mammals) highlighting major characters.

Organism and Environment

Species: Origin and concept of species, population; interaction between environment and populations; community. Biotic community, interaction between different species, biotic stability, changes in the community-succession. Ecosystem; Interaction between biotic and abiotic components; major ecosystems; manmade ecosystem Agroecosystem. Biosphere; flow of energy, trapping of solar energy, energy pathway, food chain, food web, biogeochemical cycles, calcium and sulphur, ecological imbalance and its consequences. Conservation of natural resources; renewable and non-renewable (in brief). Water and land management, wasteland development. Wild life and forest conservation; causes for the extinction of some wild life, steps taken to conserve the remaining species, concept of endangered species Indian examples, conservation of forest; Indian forests, importance of forests, hazards of deforestation, afforestation. Environmental pollution, air and water pollution, sources, major pollutants of big cities of our country, their effects

and methods of control, pollution due to nuclear fallout and waste disposal, effect and control, noise pollution sources and effects.

Multicellularity : Structure and Function Plant Life

Form and function. Tissue system in flowering plants; meristematic and permanent. Minerals nutrition essential elements, major functions of different elements, passive and active uptake of minerals, Modes of nutrition, transport of solutes water in plants, and photosynthesis photo chemical biosynthetic phases, diversity in photosynthetic path ways; Photosynthetic electron transport and photophosphorylation, photorespiration. Transpiration and exchange of gases. Stomatal mechanism. Osmoregulation in plants; water relations in plant cells, water potential, Reproduction and development in Angiosperm plants; asexual and sexual. Structure and functions of flower; development of male and female gametophytes in angiosperms, pollination, fertilization and development of endosperm, embryo, seed and fruit. Differentiation and organ formation. Plant hormones and growth regulation; action of plant hormones in relation to seed dormancy and germination, apical dominance. senescence and abscission. Applications of synthetic growth regulators. A brief account of growth and movement in plants.

Multicellularity: Structure and Function Animal Life

Animal tissues, epithelial, connective, muscular, nerve. Animal nutrition; organs of digestion and digestive process, nutritional requirements for carbohydrates, proteins, fats, minerals and vitamins: nutritional imbalances and deficiency diseases. Gas exchange and transport : Pulmonary gas exchange and organs involved, transport of gases in blood, gas exchange in aqueous media. Circulation: closed and open vascular systems, structure and pumping action of heart, arterial blood pressure, lymph. Excretion and osmoregulation. Ammonotelism, Ureotelism, uricotelism, excretion of water and urea with special reference to man. Role of kidney in regulation of plasma, osmolarity of mammals, role of hormones as messengers and regulators. Nervous coordination: central, autonomic and peripheral nervous systems, receptors, effectors, reflex action, basic physiology of special senses, integrative control by neuroendocrine systems. Locomotion, joints, muscle movements, types of skeletal muscles according to types of movement, basic aspects of human skeleton. Reproduction; human reproduction, female reproductive cycles. Embryonic development in mammals (upto three germ layers).

Continuity of Life

Heredity and variation: Introduction, Mendel's experiments with peas and idea of factors. Mendel's laws of inheritance. Genes: Packaging of heredity material in prokaryotes bacterial chromosome; plasmid and eukaryote chromosomes. Extranuclear genes, viral genes, linkage (genetic) maps. Sex determination and sex linkage. Genetic material and its replication. Gene expression; genetic code, transcription, translation, gene regulation, Molecular basis of differentiation.

Origin and Evolution of Life

Origin of life: Living and non-living, chemical evolution, organic evolution; Oparin ideas, Miller-Urey experiments. Interrelationship among living organisms and evidence of evolution: fossil records including geological time scale, Morphological evidence homology, vestigial organs, embryological similarities and biogeographical evidence.

Darwin 's two major contributions. Common origin of living organisms and recombination as sources of variability, selection acts upon variation, adaptation (Lederberg's replica plating experiment for indirect selection of bacterial mutants), reproductive isolation, speciation. Role of selection change and drift in determining composition of population. Selected examples : industrial melanism; drug resistance, mimicry, malaria in relation to G-6-PD deficiency and sickle cell disease.

Mutation-Their role in speciation. Their origin in speciation, their origin in organisms.

Application of Biology

Biofertilisers green manure, crop residues and nitrogen fixation (symbiotic, non-symbiotic). Applications of tissue culture and genetic engineering in crops. Domestication and introduction of animals. Livestock, poultry, fisheries (fresh water, marine, aquaculture). Improvement of animals; principles of animal breeding. Major animal diseases and their control. Insects and their products (silk, honey, wax and lac). Bioenergy, biomass, wood (combustion, gasification, ethanol). Cow dung-cakes, gobar gas plants as sources of hydrocarbons for producing petroleum, ethanol from starch and lignocellulose. Biotechnology, a brief historical account-manufacture of cheese, yoghurt, alcohol, yeast, vitamins, organic acids, antibiotics, steroids, dextrans. Scaling up laboratory findings to industrial production. Production of insulin, human growth hormones, interferon. Communicable diseases including diseases spread through blood transfusion (hepatitis, AIDS etc) Immune response, vaccines and antisera. Allergies and inflammations. Inherited diseases and dysfunctions. sex-linked diseases, genetic incompatibilities, and genetic counselling. Cancer major types, causes, diagnosis and treatment. Tissue and organ transplantation. Industrial wastes, toxicology, pollution-related diseases. Biomedical engineering-spare parts for man, instruments for diagnosis of diseases and care.

Aptitude Test In Architecture

Part I

Awareness of persons, places, buildings etc. of Architectural importance. Visualising three dimensional objects from two dimensional drawings. Visualising different sides of three dimensional objects. Identifying commonly used materials and objects based on their textural qualities and colour. Analytical reasoning Mental ability.

Part II

Three dimensional perception. Understanding and appreciation of scale and proportion of objects, building forms and elements, colour texture, harmony and contrast.

Design and drawing of geometrical or abstract shapes and patterns in pencil. Transformation of forms both 2D and 3D - union, subtraction, rotation, development of surfaces and volumes; Generation of plan, elevations and 3D views of objects. Creating two dimensional and three dimensional compositions using given shapes and forms.

Sketching of scenes and activities from memory of urban-scape (public space, market, festivals, street scenes, monuments, recreational spaces etc.), landscape (river fronts, jungles, gardens, trees, plants etc.) and rural life.

Examination

AIEEE consist of three papers with objective type questions and fourth paper - Aptitude Test for Architecture and Planning. The Aptitude Test is designed to evaluate candidate's perception, imagination, observation, creativity and architectural awareness. The question papers for the Examination shall be based on a common minimum syllabus drawn from syllabi taught in different Boards of States.

Scheme : All objective type questions (four options with single correct answer) would carry three marks. Each question would carry four marks. For each correct response, candidate will get three

marks. For each incorrect response one mark would be deducted. More than one answer indicated against a question will be deemed as incorrect response and will be negatively marked.

Paper -1 comprise Physics & Chemistry with equal weightage containing 150 objective type questions of 2 hours and 30 minutes duration. Paper - 2 comprise Mathematics containing 75 objective type questions. Paper -3 comprise of Biology & Zoology containing 75 objective type questions with equal weightage. Both these papers would be of 1 hour and 15 minutes duration. The 4th paper- Aptitude Test consist of 2 parts. Part (i) consist of 50 objective type questions and Part (ii) consist of two questions to test the drawing Aptitude of the candidates carrying a total of 100 marks. This paper would be of 1 1/2 hour duration.

Institutes

**List of Institutes/ Universities participating in AIEEE
National Institutes of Technology**

* Motilal Nehru National Institute of Technology, Allahabad (Uttar Pradesh)

* Maulana Azad National Institute of Technology, Bhopal (Madhya Pradesh)

* National Institute of Technology, Calicut (Kerela)

* National Institute of Technology, Hamirpur (Himachal Pradesh)

* Malviya National Institute of Technology, Jaipur (Rajasthan)

* Dr. B R Ambedkar National Institute of Technology, Jalandhar (Punjab)

* National Institute of Technology, Jamshedpur (Bihar)

* National Institute of Technology, Kurukshetra (Haryana)

* Visvesvaraya National Institute of Technology, Nagpur (Maharashtra)

* National Institute of Technology, Rourkela (Orissa)

* National Institute of Technology, Silchar (Assam)

* Sardar Vallabhbhai Patel National Institute of Technology, Surat (Gujarat)

* Karnataka National Institute of Technology, Surathkal (Karnataka)

* National Institute of Technology, Warangal (Andhra Pradesh)

Regional Engineering College, Durgapur (West Bengal)

*

Regional Engineering College, Tiruchirapalli (Tamil Nadu)

IIITs & IIITM

*

Indian Institute of Information Technology, Allahabad (UP)

*

Atal Bihari Vajpayee Indian Institute of Information Technology & Management, Gwalior

*

International Institute of Information Technology, Hyderabad

Deemed Universities

*

Allahabad Agricultural Institute, Allahabad

*

Amrita Institute of Technology, Amrita Vishwa Vidyapeetham, Coimbatore

*

Avinashilingam Institute for Home Science & Higher Education for Women, Coimbatore

*

Bharati Vidyapeeth, Pune

*

Birla Institute of Technology, Mesra, Ranchi

*

College of Engineering & Technology, Gurukul, Haridwar

*

Dayalbagh Educational Institution, Dayalbagh, Agra

*

Dr. MGR Educational and Research Institute, Chennai

*

Manipal Academy of Higher Education, Manipal

*

Sathyabama Institute of Science & Technology, Chennai

*

School of Planning & Architecture, New Delhi

*

Shanmugha Arts, Science, Technology & Research Academy (SASTRA), Thanjavur

*

Thapar Institute of Engineering & Technology, Patiala

*

Vellore Institute of Technology, Vellore

Other Institutions

*

National Institute of Foundry & Forge Technology, Ranchi

*

Chandigarh College Of Architecture, Chandigarh

*

Chandigarh College Of Engineering & Technology, Chandigarh

*

Punjab Engineering College, Chandigarh

States / UTs

*

Haryana - 15% seats through Haryana State Counselling

*

Himachal Pradesh - 100% seats through Himchal Pradesh Counselling

*

Punjab & Orissa - 100% seats through Counselling to be done by respective State

*

Rajasthan - 15% of the open seats other states through Rajasthan State Counselling

*

Uttaranchal - 100% seat through Uttaranchal State Counselling

*

Army Institute of Technology, Pune - 100% seat through their own counselling