APPENDIX II - AEEE 2026 Syllabus

MATHEMATICS

Unit 1: Sets, Relations and Functions: Sets and their representation: Union, intersection and complement of sets and their algebraic properties; Power set; Relation, Type of relations, equivalence relations, functions; one-one, into and onto functions, the composition of functions.

Unit 2: Complex Numbers: Complex numbers in the form a+ib and their representation on 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.

Unit 3: Permutations and Combinations: Fundamental principle of counting; Permutation as an arrangement and combination as selection, simple applications.

Unit 4: Binomial Theorem: Binomial theorem for positive integral indices. General and middle terms in binomial expansions, simple applications.

Unit 5: 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 ∑n, ∑n2, ∑n3.Arithmetico-Geometric Series, Exponential and Logarithmic Series.

Unit 6: Matrices and Determinants: Determinants and matrices of order two and three, Properties of determinants. Evaluation of determinants. Addition and multiplication of matrices, adjoint and inverse of matrix. Solution of simultaneous linear equations using determinants.

Unit 7: Quadratic Equations: Quadratic equations in real and complex number system and their solutions. Relation between roots and coefficients, Nature of roots, Formation of quadratic equations with given roots.

Unit 8: Trigonometry: Trigonometrical identities and equations. Inverse trigonometric functions and their properties. Properties of triangles including centroid, incentre, circumcentre and orthocentre, Solution of triangles. Heights and distances.

Unit 9: 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.

Unit 10: 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.

Unit 11: Differential Calculus: Polynomials, rational, trigonometric, logarithmic and exponential 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 upto two, Applications of derivatives; Maxima and Minima of functions one variable, tangents and normals, Rolle's and Langrage's Mean Value Theorems.

Unit 12: 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 a limit of sum; Properties of definite integrals. Evaluation of definite integral; Determining areas of the regions bounded by simple curves.

Unit 13: Differential Equations: Ordinary differential equations, their order and degree; Formation of differential equation; Solutions of differential equations by the method of separation of variables; Solution of Homogeneous and linear differential equations of first order.

Unit 14: Co-ordinate Geometry: Review of Cartesian system of rectangular co-ordinates in a plane, distance formula, area of triangle, condition for the collinearity of three points, slope of a line, parallel and perpendicular lines, intercepts of a line on the coordinate axes.

Unit 15: 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, equation of family 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 intersections and angles between two lines.

Unit 16: 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 circle with the centre at the origin and condition for a line to be tangent, equation of a family of circles through the intersection of two circles, condition for two intersecting circles to be orthogonal.

Unit 17: Conic Sections: Sections of cones, equations of conic sections (parabola, ellipse and hyperbola) in standard forms, conditions for $y = mx+c$ to be a tangent and point(s) of tangency.

Unit 18: Vector Algebra: Vector and scalars, addition of two 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.

Unit 19: Three-Dimensional Geometry: Distance between two points. Direction cosines of a line joining two points. Cartesian and vector equation of a line. Coplanar and skew lines. Shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines (ii) two planes (iii) a line and a plane. Distance of a point from a plane.

PHYSICS

Unit 1: Units and dimensions: Units for measurement, system of units, SI, fundamental and derived units, dimensional analysis.

Unit 2: Kinematics: Uniform and non-uniform motion, average speed and instantaneous velocity, uniformly accelerated motion, velocity - time, position-time graph, 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: Mechanics: Motion in one-dimension, uniform and non-uniform motion, uniformly accelerated motion; Scalars and Vectors, resolution of Vectors, vector properties. Motion in a plane, Projectile motion, Uniform circular motion.

Newton's laws of motion, conservation of linear momentum, Friction; Work-Energy theorem, kinetic energy, potential energy, conservation of energy; elastic collision in one and two dimensions.

Center of mass of a system of particles, centre of mass of a rigid body, rotational motion and torque, angular momentum and its conservation, moments of inertia for various geometries, parallel and perpendicular axes theorem.

Universal law of gravitation, acceleration due to gravity, planetary motion, Kepler's laws, Satellites, gravitational potential and potential energy and escape velocity.

Unit 4: Solids and Fluids

Solids: Elastic properties, Hooke's law, Young's modulus, bulk modulus, rigidity modulus.

Liquids: Cohesion and adhesion; surface energy and surface tension; flow of fluids; Bernouli's theorem and applications; viscosity, Stoke's law, terminal velocity

Unit 5: Oscillations and Waves

Oscillations: Oscillatory motion - periodic and non-periodic motion; simple harmonic motion (SHM), angular SHM, linear harmonic oscillator – both horizontal and vertical; combination of springs – series and parallel, simple pendulum; Expression of energy – potential energy, kinetic energy and total energy; Graphical representation of SHM; Types of oscillations – free, damped, maintained and forced oscillations and resonance.

Wave Motion: Properties of waves; Transverse and Longitudinal waves; Superposition of waves, Progressive and Standing waves; Vibration of strings and air columns, beats, Doppler Effect.

Unit 6: Heat and Thermodynamics: Heat, work and temperature; Ideal gas laws; Specific heat capacity, Thermal expansion of solids, liquids and gases, Relationship between Cp and Cv for gases; Newton's law of cooling, black body, Kirchoff's law, Stafan's law and Wein's law, thermodynamic equilibrium, internal energy; Zeroth, first and second law of thermodynamics, thermodynamic processes, Carnot cycle, efficiency of heat engines, refrigerator

Unit 7: Electrostatics, Current Electricity and Magnetostatics

Electric charges and Fields: Electric Charge; Conductors and Insulators, Charging by Induction, Basic Properties of Electric Charge, Coulomb's Law, Forces between Multiple Charges, Electric Field, Electric Field Lines, Electric Flux, Electric Dipole, Dipole in a Uniform External Field, Continuous Charge Distribution, Gauss's Law, Applications of Gauss's Law.

Electrostatic potential and Capacitance: Electrostatic potential, Potential due to a point charge, electric dipole, system of charges. Equipotential surfaces; Potential energy of a system of charges, potential energy in an external field, Electrostatics of conductors, Dielectric and Polarization, Capacitors and Capacitance, parallel plate capacitor, effect of dielectric on capacitance combination of capacitors, energy stored in a capacitor, Van de Graaff Generator.

Current Electricity: Electric current, electric currents in conductors, Ohm's law, drift of electrons and the origin of Resistivity, temperature dependence of resistivity, electrical energy, power, combination of resistors, series and parallel, cells, emf, internal resistance, cells in series and in parallel, Kirchhoff's Rules, Wheatstone bridge, Meter bridge, potentiometer.

Heating effects of current: Electric power; concept of thermoelectricity – Seebeck effect and thermocouple, chemical effect of current – Faraday's laws of electrolysis.

Magnetic effects: Oersted's experiment, BiotSavart's law, 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 a current carrying conductor in a magnetic field, force between current carrying wires, moving coil galvanometer and conversion to ammeter and voltmeter.

Magneto statistics: Bar magnet, magnetic field, lines of force, torque on a bar magnet in a magnetic field, earth's magnetic field; para, dia, and ferro magnetism, magnetic induction and magnetic susceptibility.

Unit 8: Electromagnetic Induction and Electromagnetic Waves

Electromagnetic Induction: Induced e. m. f: Magnetic flux, Faraday's law, Lenz's Law and Conservation of Energy, self and mutual inductance.

Alternating Current: Impedance and reactance; power in AC circuits; AC voltage applied to resistor, inductor, capacitor, LCR circuits and resonance, transformer and AC generator.

Electromagnetic Waves: Electromagnetic waves characteristics, electromagnetic spectrum from gamma to radio waves.

Unit 9: Kinetic Theory of Gases: Equation of state of a perfect gas, work done on compressing a gas, Kinetic theory of gases - assumptions, the 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: Ray and Wave Optics

Ray Optics and optical instruments: Reflection and refraction of light by plain spherical mirrors - Total Internal Reflection; optical fiber; deviation and dispersion of light by a prism; lens formula; magnification and resolving power; microscope and telescope.

Wave Optics: Huygens principle: Wave nature of light, interference of light waves and Young's experiment, thin films, Newton's rings, Diffraction – single slit, grating, Polarization and applications.

Unit 11: Modern Physics

Dual nature of radiation and matter: De Broglie relation, Electron emission, photoelectric effect, experimental study, Einstein's photoelectric equation: Energy quantum of radiation; particle nature of light, the photon, wave nature of matter.

Atoms: Alpha-particle scattering and Rutherford's nuclear model of atom, atomic spectra, Bohr model of the hydrogen atom; the line spectra of the hydrogen atom.

Nuclei: Atomic masses and composition of nucleus; size of the nucleus; mass-energy and nuclear binding energy; nuclear force; radioactivity; nuclear energy

Semiconductor materials, devices and simple circuits: Energy bands in solids; classification of metals, conductors and semiconductors; intrinsic semiconductor, extrinsic semiconductor, p-n junction, semiconductor diode, junction diode as a rectifier, junction transistor, transistor as an amplifier.

CHEMISTRY

Unit 1 – Basic Chemical calculations: Density - mole concept - empirical and molecular formula – stoichiometry - volumetry, equivalent and molecular masses, percentage composition

Unit 2 - Atomic structure & periodicity: atomic models, sub-atomic particles, orbital shapes, Pauli's exclusion, Hund's rule, Aufbau principle, de-Broglie relation, Heisenberg's uncertainty, electronic configuration and periodic properties.

Unit 3 - Chemical bonding: Ionic bonding, lattice energy – Born-haber cycle, covalent bond - Fajan's Rule –VSEPR theory -- hybridization, valence bond and molecular orbital theory, coordinate, metallic and hydrogen bonding

Unit 4 - S-block and hydrogen: Hydrogen, isotopes, liquid hydrogen as fuel, alkali metals, oxides and hydroxides, extraction and properties of lithium, sodium and potassium. Group 2 elements and their properties.

Unit 5 - P-block elements: Boron - borax, boranes, diboranes, Carbon - allotropes, oxides, carbides, halides and sulphides of carbon group- silicon and silicates – silicones, Nitrogen – Fixation – compounds of nitrogen- Phosphorous – allotropes and compounds. Oxygen - oxides and peroxide. Sulphur – its compounds - inter-halogen compounds.

Unit 6 - d and f block elements: d-block elements configuration and properties - transition elements, chromium, copper, zinc, silver, interstitial compounds and alloys, f - block elements and extraction, lanthanides and actinides

Unit 7 - Solid state: Solids - amorphous and crystalline, classification of crystalline - unit cell, Miller indices - packing efficiency, unit cell dimensions, crystal structure, ionic crystals, imperfections in solids, electric and magnetic properties.

Unit 8 - Coordination compounds: Terminology in coordination- isomerism, Werner, VBT, CFT theories - Bio- coordination compounds.

Unit 9 - Gaseous State & Surface chemistry: Gaseous state and gas laws, deviation- van der Waal's constants - Joule-Thomson effect - liquefaction of gases, theory of catalysis, colloids and emulsions.

Unit 10 - Colligative properties: Lowering of vapour pressure, Depression of freezing point, Elevation in boiling point, Osmotic pressure, abnormality - dissociation and association

Unit 11 – Electrochemistry: Faraday's laws - specific, equivalent and molar conductance, Kohlraush's law and applications- electrode potentials - EMF, electrochemical and galvanic cells, Nernst equation, batteries, fuel cells, corrosion and its prevention.

Unit 12 -Thermodynamics: First and second law- internal energy, enthalpy, entropy, free energy changes– specific heats at constant pressure and constant volume – enthalpy of combustion, formation and neutralization, Kirchoff law – Hess's law - bond energy

Unit 13 - Chemical and Ionic Equilibria: Law of chemical equilibrium, homogenous and heterogeneous equilibrium, Le Chatlier's principle, equilibrium constants, factors affecting- Ionic equilibrium, ionization of acids and bases, buffer solutions, pH -solubility of sparingly soluble salts

Unit 14 - Chemical kinetics: Order, molecularity, rate and rate constant – first and second order

reactions - temperature dependence, factors influencing rate of reaction, integrated rate equation, collision theory of chemical reaction

Unit 15 - Basic Organic chemistry: Classification, functional groups, nomenclature and isomerism, types of organic reactions, mechanism, purification, qualitative and quantitative analysis carbocation, carbanion and free radical, electron displacement in covalent bond.

Unit 16 - Hydrocarbons & Polymers: IUPAC nomenclature, alkanes –alkynes – aromatic hydrocarbons- nomenclature, preparation, physical and chemical property uses. Polymerization – types, molecular mass, biodegradable and commercial polymers.

Unit 17 - Organic halogen compounds: Nature of C-X bond - preparation - properties and reactions of alkyl and aryl halides- polyhalogen compounds - substitution and elimination – mechanism- Grignard reagents.

Unit 18 - Stereochemistry and Organic nitrogen compounds: Preparation - properties and uses of Aliphatic and aromatic nitro compounds --aliphatic and aromatic amines, nitriles, Diazonium salts. – 1°, 2°, and 3° amines – distinction - Optical activity.

Unit 19 - Organic functional groups – hydroxyl, carbonyl compounds and ethers: Nomenclature, preparation, properties and uses of alcohols, ethers, aldehydes, ketones, aliphatic carboxylic acids, benzoic acid - salicylic acid.

Unit 20 - Biomolecules and Environmental chemistry: Carbohydrates, proteins, amino acids - enzymes, vitamins, and nucleic acids - lipids. Pollution. - air, water and soil - industrial waste, acid rain, greenhouse effect, global warming, Strategies to control pollution.

ENGLISH

Articles, Synonyms, Antonyms, Preposition, Verbs.

Note:

This handbook contains general information and rules regarding the Amrita Engineering Entrance Examination 2026 and other relevant details. Candidates are required to go through the handbook carefully and acquaint themselves with the procedures relating to the admission. The contents of the handbook are subject to modification, as may be deemed necessary, by the University. The decision of the University will be final and binding on any issue related to the admission.