Admission Test
Syllabus

Section 1 : Physics	Problems:6	Theory:4	Total:10

1.1 Physical World and Measurement

Units and dimensions, measurement accuracy, significant figures, and dimensional analysis.

1.2 Kinematics and Dynamics

Motion in one, two, and three dimensions; projectile and circular motion; Newton's laws; concepts of force, inertia, friction, and momentum conservation.

1.3 Work, Energy, and Power

Work by constant and variable forces, kinetic and potential energy, conservation of energy, work-energy theorem, and collisions.

1.4 Motion of Systems and Rigid Bodies

Center of mass, torque, rotational motion, moment of inertia, angular momentum, and related conservation laws.

1.5 Gravitation and Properties of Matter

Newton's law of gravitation, acceleration due to gravity, elasticity, pressure, viscosity, and surface tension.

1.6 Kinetic Theory and Thermodynamics

Gas laws, kinetic theory, degrees of freedom, and energy interpretation of temperature.

1.7 Oscillations and Waves

Simple harmonic motion, resonance, wave properties, superposition, and Doppler effect.

1.8 Electrostatics and Current Electricity

Coulomb's law, electric field and potential, Gauss's law, capacitance, Ohm's law, Kirchhoff's laws, and electrical circuits.

1.9 Magnetism and Electromagnetic Induction

Biot–Savart law, Ampere's law, electromagnetic force, Earth's magnetism, Faraday's and Lenz's laws, AC circuits, and transformers.

1.10 Optics and Modern Electronics

Reflection, refraction, lenses, wave optics, electromagnetic spectrum, semiconductors, diodes, transistors, logic gates, and communication systems.

Section 2:Chemistry	Problems:1	Theory:4	Total:5

2.1 Basic Concepts & Stoichiometry

Mole concept, Molar mass, empirical & molecular formula, Chemical equations & stoichiometric calculations, Limiting reagent, Concentration terms: Molarity, Molality, Normality, Mole Fraction.

2.2 Ionic Equilibrium

Acids & bases (Arrhenius, Bronsted, Lewis), pH, pOH, Buffers, Hydrolysis of salts, Solubility product (Ksp)

2.3 Electrochemistry

Redox reaction, Electrochemical cells, Galvanic & electrolytic cells, Standard electrode potential, Nernst equation (basic calculations), Conductivity & molar conductivity, Batteries (lead-acid, Li-ion), Fuel cells

2.4 Environmental Chemistry

Hardness of water, Water pollution, Air pollution (SO_x, NO_x, greenhouse gases), Waste management (solid waste, e-waste), Corrosion (Types, mechanism & Protection methods)

2.5 Biomolecules & Polymers

Carbohydrates, Proteins, Nucleic acids (DNA & RNA), Types of polymerization (addition & condensation), Important polymers (PVC, Teflon, Nylon, Polyester, Bakelite), Biodegradable polymers (PHBV).

Section 3 :Mathematics	Problems:12	Theory:3	Total:15

3.1 SETS, RELATIONS AND FUNCTIONS.

- ○ Sets, types of sets, Representation of sets, set operations, types of relations, types of functions, Domain and range.

3.2 TRIGONOMETRY.

- ○ Angles(degree and radian), Trigonometric functions and graphs, Trigonometric Identities, Trigonometric equations(basic only, no general solutions), properties of triangles(basic formulas).

3.3 COMPLEX NUMBERS AND QUADRATIC EQUATIONS.

- ○ Algebra of complex numbers, modulus, argument, quadratic equations and nature of roots, relation between roots and coefficients.

3.4 PERMUTATIONS, COMBINATIONS AND BINOMIAL THEOREM.

- ○ Fundamental counting principle, Permutations, combinations, binomial theorem for positive integers, general term, middle term.

3.5 SEQUENCES AND SERIES.

- ○ AP and GP, Sum of n terms of AP and GP.

3.6 MATRICES AND DETERMINANTS.

- ○ Types of matrices, matrix operations, determinants of order 2 and 3, area of triangle using determinant, Inverse of matrix using adjoint, Solving linear equations using matrices (2 * 2 and 3 * 3).

3.7 STRAIGHT LINES.

- ○ Slope of a line, various forms of equation of line, Distance between 2 points, section formula, angle between 2 lines.

3.8 CONIC SECTIONS.

- Standard equations and basic properties of Circle, Parabola, Ellipse, Hyperbola.

3.9 VECTORS.

- Types of vectors, magnitude and direction,position vector, scalar product and vector product.

3.10 3 - D GEOMETRY.

- Coordinates of a point in space, distance between 2 points, direction cosines and ratios, equation of a line(vector and cartesian form), equation of a plane, angle between 2 lines, angle between line and plane.

3.11 LIMITS AND CONTINUITY.

- Basic concepts, Standard limits, Continuity of functions.

3.12 DIFFERENTIATION.

- Derivatives of different types of functions, Rules of differentiation, implicit differentiation, derivatives of inverse trigonometric functions, applications of derivatives (increasing/decreasing, maxima/minima).

3.13 INTEGRALS.

- Indefinite integrals, integration by substitution, integration by parts, integration using partial fractions, definite integrals, areas under curves(bounded by standard curves only).

3.14 DIFFERENTIAL EQUATIONS.

- Order and degree, Formation of differential equations, General and particular solution, first order linear differential equation.

3.15 PROBABILITY AND STATISTICS.

- Basic probability, Addition and multiplication rules, conditional probability,

Bayes' theorem, mean of random variable.			
Section 4 :Aptitude	Problems: 5	Theory:0	Total:5

4.1. <u>Logical Reasoning: Verbal Reasoning</u>

Analogy, Classification/Odd One Out, Coding–Decoding, Series (Alphabet & Numbers), Direction Sense, Blood Relations, Logical Sequence of Words

4.2. <u>Logical Reasoning: Non-Verbal Reasoning</u>

Pattern Completion, Mirror & Water Images, Figure Series, Embedded Figures, Paper Folding & Cutting

4.3. <u>Logical Reasoning: Analytical Reasoning</u>

Statement & Conclusions, Course of Action, Cause & Effect, Assumptions, Puzzles

4.4 <u>Higher Order Aptitude Skills: Critical Thinking and Quantitative Logic</u>

Logical Deductions, Pattern Recognition, Data Comparison, Argument Evaluation, Venn Diagram Problems, Set Theory Basics, Probability (Basic level), Permutation & Combination (Intro)

4.5 <u>Higher Order Aptitude Skills: Problem-Solving</u>

Real-life application problems, Mathematical modelling, Strategy-based puzzles, Speed-building techniques

Section 5 :Psychometric/ Situational Aptitude	Problems: 5	Theory: 0	Total: 5

<u>SITUATIONAL APTITUDE</u>

Decision–Making Skills- Analytical Decision-Making, Logical Reasoning in Situations (Cause–effect relationships, identifying contradictions, Problem-solving under constraints). Critical Thinking (Pros and cons analysis, differentiating facts and assumptions, drawing conclusions from incomplete data). Emotional Intelligence (EQ) (Identifying emotions under pressure, managing stress in scenarios, understanding others perspectives, Empathy-based decision-making), Relationship Management, Ethical & Moral Judgment (Integrity and honesty in decisions, Handling confidential information), Workplace Situation Handling- Team & Leadership Situation, Customer/Client Handling, Organizational Scenarios, Real-Life

Situational Scenarios (Emergency decision-making, unexpected problem situations)			
Section 6: English	Problems:	Theory: 5	Total: 5
Section: Reading Comprehension Format: One passage, followed by 5 multiple-choice questions Skills assessed: • Understanding of key ideas • Interpretation and inference • Vocabulary in context • Ability to connect and evaluate ideas			
Section 7A: Subject Specific: Civil Engineering	Problems: 0	Theory: 5	Total:
7A.1 Basic Civil Engineering Awareness **7A.2 Common construction materials (cement, steel, brick, concrete)** **7A.3 Basic parts of a building (foundation, columns, beams, slab, walls)** **7A.4 Types of simple structures (bridges, dams, roads, buildings)** **7A.5 Role of civil engineers in society** **Environmental awareness (water conservation, waste management)**			
Section 7B: Subject Specific: Computer Science and Engineering	Problems: 2	Theory: 3	Total: 5
7B.1 Basics of Computers - Generations of Computers, Hardware vs. Software, Input/Output Devices, Memory (Primary, Secondary) **7B.2 Number Systems-** Binary, Decimal, Octal, Hexadecimal,Conversions between number systems, Binary arithmetic **7B.3 Operating Systems-** Types of OS,Process, Memory, File Management,Linux/Windows basics **7B.4 Computer Networks-**Types of Networks (LAN, WAN, MAN),Internet basics,IP address,			

DNS, HTTP, HTTPS,Network devices: Router, Switch, Hub

7B.5 Programming & Problem Solving-Programming Concepts, Algorithms & Flowcharts, Variables, Data Types,Control Statements (if, loops),Functions,Basic Debugging

Section 7C: Subject Specific: Electrical Engineering	Problems: 2	Theory: 3	Total: 5

7C.1. Voltage, Current, Power, Energy

7C.2. Resistance, Inductance, Capacitance

7C.3. DC and AC

7C.4. Electrical parameters measuring devices & Electrical protection devices

7C.5. Scientists, Pioneers and recent trends related to Electrical Engineering

Section 7D: Subject Specific: Electronics and Communication Engineering	Problems:2	Theory:3	Total:5

- **7D.1 Semiconductors Basics**
  p-n junction diode, LED, Zener diode.
  BJT transistor types and symbols.

- **7D.2 Digital Logic**
  Logic gates (AND, OR, NOT).
  Binary numbers and simple adders.

- **7D.3 Audio Speakers**
  Transistor signal boosting.
  Simple amplification for sound output.

- **7D.4 Electronics Around Us**
  Sensors in daily gadgets (thermostats, touchscreens).

  LED displays, batteries in remotes and toys.

- **7D.5 Modern Communication Awareness**
  3G/4G/5G speed differences and uses.
  6G basics: faster internet, smart cities.

Section 7E: Subject Specific: Mechanical Engineering	Problems:2	Theory:3	Total:5

7E.1 Engineering Measurements & Fundamental Concepts

• Physical quantities commonly used in engineering

• SI units and unit conversion (basic problems)

• Dimensions of basic quantities (length, mass, time, force, energy)

• Dimensional analysis for checking equations (conceptual)

• Accuracy, precision, and significant figures (objective-level)

7E.2 Motion, Forces & Energy in Engineering Systems

• Types of motion: linear and circular (conceptual + simple numericals)

• Velocity and acceleration (basic understanding)

• Newton's laws and their engineering applications

• Friction: advantages and limitations in machines

• Work, energy, and power with real-life machine examples

• Efficiency of mechanical systems (basic idea)

7E.3 Rotational Motion & Mechanical Components

• Angular motion (qualitative understanding)

• Torque and its applications (lever, wrench, wheel)

• Moment of inertia (concept only, no derivation)

• Rotational kinetic energy

• Use of rotating components: gears, pulleys, flywheels, shafts

7E.4 Materials, Fluids & Thermal Applications

Materials:

• Stress and strain (definitions & units)

• Elastic behavior and Hooke's law

• Mechanical properties: hardness, ductility, toughness, brittleness

• Selection of materials for engineering use

Fluids:

• Density and pressure in fluids

• Pascal's law and hydraulic applications

• Buoyancy and floating

• Viscosity and lubrication

Thermal Concepts:

• Heat and temperature (difference)

• Specific heat and thermal expansion

• Modes of heat transfer

• Basic idea of heat engines and efficiency

7E.5 Mechanical Engineering in Daily Life & Society

- Mechanical engineering in transportation, agriculture, and construction

- Common machines: pumps, engines, compressors, household appliances

- Energy efficiency and sustainable mechanical systems

- Introduction to electric vehicles and renewable energy devices

- Role of mechanical engineers in industry, infrastructure, and society

*In section 7, the student will have to answer only the part corresponding to the branch opted.
* Each correct answer will fetch 2 marks, and each wrong answer will reduce 0.5 marks
* The exam will be in 100 marks