



राष्ट्रीय प्रौद्योगिकी संस्थान, कुरुक्षेत्र
NATIONAL INSTITUTE OF TECHNOLOGY
(Under the Ministry of Education, Govt. of India)
KURUKSHETRA-136119

RECRUITMENT OF NON-TEACHING POSTS (REF.:ADVT. NO.:21/2025)

Name of the Post	:	Technician (Level - 3)
Details of the Scheme & Pattern of Examination:	:	<ul style="list-style-type: none">Total Questions :160 (MCQ Type)Maximum Marks :160Negative Marking : 0.25 marks will be deducted for each wrong answer <p>Part-A (General Paper) (60)</p> <ul style="list-style-type: none">General English (15)Numerical Aptitude Arithmetic (15)Reasoning and Data Interpretation (15)General Knowledge and Current Affairs (15) <p>Part-B (Post Related Paper): (100)</p>
Duration of Examination	:	2.5 hours

SYLLABUS FOR WRITTEN TEST

Part-A (General Paper)

- General English** - Tenses, Active and Passive, Direct & Indirect speech, Punctuation, Correction of sentence, One word substitutes, Modals, Articles, Clauses, Synonyms, Antonyms, Idioms & Phrases.
- Numerical Aptitude Arithmetic** - Simplification of Fractions, Simple and Compound Interest, Profit and Loss, Percentage, Averages, Number System, Time and Work, Problems on Trains, Calendar, Area, Problems on Numbers, Square root, Cube root, Time and Distance and Other Basic Arithmetic related problems.
- Reasoning and Data Interpretation** - Number Series Compilation, Missing Number finding, Pattern series, Direction Sense Test, Series Compilations, Classification, Missing Character finding, odd man out, Blood relations, Analogy, Coding & Decoding, Letter & Symbol Series, Verbal reasoning, Statements & Conclusions, Letter & Symbol Series, Logical Problems, Arithmetic Reasoning, Logical Sequence of Words, Pie Chart & Bar Chart
- General Knowledge and Current Affairs**- Indian History, Indian Economy, Indian Culture, Indian Polity, Indian Constitution, Indian Geography, Environmental Science, Awards and Honors, Famous Personalities, Days and Years, Basic General Knowledge, Current Affairs, Government Schemes, etc. upto 10th Standard.

Part-B (Post Related Paper)

Technician (Civil Engineering):

1. **Computer awareness:** Basic knowledge of Computer Applications, viz; MS Word, MS Excel, Power Point etc. Internet, MS-DOS, Data Entry, Softwares knowledge, applications of computers in civil engineering
2. **Surveying:** Introduction, History and principles of chain survey. Classification, accuracy, types of chains and tapes. Direct and Indirect ranging.
3. **Compass survey:** Instrument and its setting up, Bearing and each included angle of close traverse. Local attraction. Magnetic declination and its true bearing. Precaution in using prismatic compass.
4. **Levelling:** Auto level, dumpy Level, Tilting Level - introduction, definition - Principle of levelling. Levelling staffs, its graduation & types. Temporary and permanent adjustment, procedure in setting up. Level & horizontal surface. Datum Benchmark, Focusing & parallax Deduction of levels / Reduced Level. Types of leveling, Application to chain and Levelling Instrument to Building construction. Reciprocal levelling.
5. **Contouring:** Definition, Characteristics, Methods. Direct and Indirect methods - Interpolation of Contour, Contour gradient, Uses of Contour plan and Map. Application of contouring for road project.
6. **Theodolite survey:** Introduction. Types of theodolite. Uses, Methods of Plotting. Transit vernier theodolite. Terms of transit theodolite. Fundamental line of theodolite. Adjustment of theodolite.
7. **Total Station:** Introduction. Components parts, accessories used.
8. **GPS (Global Positioning System):** Introduction of GPS system. Definition and application of Remote sensing.
9. **Water supply:** Introduction. Terms used in PHE. Various types of water supply pipes and fittings. Material specification. Type of overhead and underground water tanks. Tools and equipment's used in water supply system. Basic concept, terminology and process used in Water treatment plant -
10. **Systems of sanitation:** System of house drainage, plumbing, sanitary fittings, etc. Types of sewer appurtenance, Systems of plumbing. Type of sewage disposals. Manholes, soak pit & Septic tank. Basic concept, terminology and process used in Sewerage treatment plant.

Technician (Electrical Engineering):

1. **Mathematics:** Arithmetic, Geometric and Harmonic Progressions, Binomial expansion, Matrices, Elementary operations, Rank of a matrix Parabola, Ellipse and Hyperbola, Differentiation of a function, implicit function, parametric function. Successive differentiation. Maxima and Minima, Partial Differentiation, Definite and indefinite Integration. First order and first degree ordinary differential equations.
2. **Physics:** Units and Dimensions with Dimensional analysis and their Limitation, Motion in one and two dimensions and Newton's Laws of Motion. Work and Energy and Conservation Laws of energy, Properties of matter i.e. Elasticity, Surface tension and viscosity in fluent motion, waves and vibration. Characteristics of waves and Simple Harmonic Motion, Rotational Motion, Conservation on angular momentum, Gravitation, Newton's law of gravitation, Kepler's law and Satellite, Heat and temperature. Measurement of temperature and mode of transfer of heat and their laws, geometric optics and simple optical instruments, Simple Law of

electrostatics and their use to find the E and potential. Capacitors and dielectric constant, Laser, its principle and use, Superconductivity, Conventional and Non-Conventional energy sources.

3. **Elements of Electrical Engineering:** Electrical and Magnetic circuits, EMF, Kirchhoff's law and Faraday's Laws, Network Theorems, AC circuit, RMS value Behavior of RIC elements, Series and parallel circuits, series and parallel resonance circuits, Transformers, Introduction to single phase and three phase transformers DC Machines, Theory, Constructions and Operation of three phase induction motors, Transmission and Distribution Advantages of high voltages for transmission, Comparison of 3 phase, single phase, 2 Phase and three wire D.C. Systems.
4. **Elements of Electronic Engineering:** Measurements & Instrumentations, Errors, standards, accuracy precision resolution, Ammeters, Voltmeters, watt meters Energy meters, insulation tester, multimeter, CRO, measurement of V, I & F on CRO low, medium & high resistance measurement, AC bridges Transducers for measurement of temperature, displacement, communication system, types of modulation, demodulation, Analog Electronics Semiconductor diode circuits, zener diode and zener diode circuits, LED, photo diode, BJT, FET & their configurations and characteristics Biasing, small signal and Large signal amplifier, OP-AMPS, oscillators, regulated power supply.
5. **COMPUTER LITERACY:** Characteristics of Computer, Computer Organization, Input/output Devices, Computer Software-Relationship between Hardware and Software, Operating Systems, MS-Office (exposure of Word, Excel/spread sheet, Power point). Digital Signature, Application of information technology in Government for e-Governance, mobile/Smartphone, Information tasks.

Technician (Mechanical Engineering):

1. **Computer awareness:** Basic knowledge of Computer Applications, viz; MS Word, MS Excel, Power Point etc. Internet, MS-DOS, Data Entry, Softwares knowledge, applications of computers in mechanical engineering
2. **Automobile Engineering:** Automobile and its development, Classification of automobiles, Transmission System, Steering System, Braking System, Dynamo and Alternator and Exhaust Emissions
3. **Computer Integrated Manufacturing:** Introduction to NC, CNC & DNC, Construction and Tooling, Part Programming, System Devices, Problems in CNC Machines, Automation and NC system
4. **Engineering Materials:** Scope of Material Science, Crystallography, Metals and Alloys, Heat Treatment, Plastics and Advanced Materials Engineering Mechanics: Laws of Forces, Moment, Friction, Centre of Gravity and Simple Machines
5. **Fluid Mechanics:** Type and Properties of Fluids, Pressure and its Measurement, Flow of Fluids and Flow through Pipes
6. **Heat-Transfer:** Modes of Heat Transfer, Fourier's Law, Steady State Conduction, Composite Structures, Natural and Forced Convection and Thermal Radiation junction
7. **I.C. Engines:** Working principle of two stroke and four stroke cycle, SI engines and CI Engines, Otto cycle, Diesel cycle, Dual cycle, Fuel Supply and Ignition System in Petrol Engine, Fuel System of Diesel Engine, Cooling and Lubrication and Testing of IC Engines
8. **Machine Design:** Design-Definition, Types of design, necessity of design, Design terminology: stress, strain, factor of safety, factors affecting factor of safety, stress

concentration, methods to reduce stress concentration, fatigue, endurance limit, Design Failure, Design of Shaft, Design of Key, Design of Joints, Design of Flange Coupling and Design of Screwed Joints

9. **Machining and Machine Tool Operations:** Cutting Tools and Cutting Materials, Lathe, Drilling, Boring, Shaping and Planning, Broaching, Jigs and Fixtures and Cutting Fluids and Lubricants, Welding, Pattern Making, Metal Forming Processes
10. **Mechanics of Materials:** Stresses and Strains, Resilience, Moment of Inertia, Bending Moment and Shearing Force, Bending Stresses, Columns, Torsion and Springs
11. **Metrology and Inspection:** Linear and Angular Measurement, Measurement of Surface Finish and Measurements of Screw threads and Gauges
12. **Refrigeration and air-conditioning:** Fundamentals of Refrigeration, Vapour Compression System, Refrigerants, Air Refrigeration System, Vapour Absorption System and Refrigeration Equipment
13. **Theory of Machines:** Simple Mechanisms, Friction, Power Transmission, Flywheel, Governor and Balancing
14. **Thermodynamics:** Fundamental Concepts, Laws of Perfect Gases, Thermodynamic Processes on Gases, Laws of Thermodynamics, Ideal and Real Gases and Properties of Steam
15. **Turbo-machinery:** Introduction to Turbomachines, Classification of Turbomachines, Steam Turbines and Steam Condensers, Gas Turbines and Jet Propulsion
16. **Vibrations:** Types-Longitudinal, Transverse and Torsional vibrations, Dampening of Vibrations, Causes of vibrations in Machines, their Harmful Effects and Remedies – ECE

Technician (Electronics & Comm. Engineering):

1. **Electronics & Comm. Engineering:** 1. Computer awareness: Basic knowledge of Computer Applications, viz; MS Word, MS Excel, Power Point etc. Internet, MS-DOS, Computer Generation & Development, UNIX, Windows, Lotus, SmartSuite, Data Entry, Softwares knowledge, Networking Platforms, applications of computers in electrical engineering
2. **Basic concepts:** Concepts of resistance, inductance, capacitance, and various factors affecting them. Concepts of current, voltage, power, energy and their units., Kirchhoff 's law, Simple Circuit solution using network theorems. Concepts of flux, mmf, reluctance, Magnetic calculations for conductors of different configuration e.g. straight, circular, solenoidal, etc. Electromagnetic induction, self and mutual induction. Instantaneous, peak, R.M.S. and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of R.L. and C, Resonance, Tank Circuit. Poly Phase system – star and delta connection, 3 phase power, DC and sinusoidal response of R- Land R-C circuit.
3. **Fundamentals of Electronics Engineering:** Semiconductor Diode, PN junction, basic principles of operation and VI characteristics of PN junction diode, static and dynamic resistance of a diode. Applications of Diode Use of a diode in rectifiers, half wave, full wave and bridge rectifier with shunt capacitor filter, series inductor filter, zener diode and its applications, as avoltage regulator, light emitting diode (LED), Transistor: Introduction to a transistor, working of a PNP and NPN transistor, input and output characteristics, transistor configurations.

4. **Digital Electronics:** 1. Number System. 2. Binary addition, subtraction, multiplication and division including binary points 3. Logic Gates and Families a) Concept of negative and positive logic b) Definition, symbols and truth tables of gates. Construction of NOT, AND and OR gates from NAND and NOR gates (universal gates). 5. Logic Simplification a) Postulates of Boolean algebra, DeMorgan's Theorems.
5. **Power Electronics:** 1. Introduction to thyristors and other Power Electronics Devices SCR - Different methods of SCR triggering. - Different commutation circuits for SCR. - Construction & working principle of DIAC, TRIAC & their V-I characteristics 2. Controlled Rectifiers
6. **Electrical Machines:** (a): D.C. Machine – Construction, Basic Principles of D.C. motors and generators, their characteristics (b): 1 phase and 3 phase transformers – Construction, Principles of operation, equivalent circuit, Tests, Losses and efficiency. (c):3 phase induction motors, rotating magnetic field, principle of operation, equivalent circuit, torque-speed characteristics.
7. **Unit and Measurement:** Definition, Classification, Fundamental and derived units, systems of units: FPS, CGS, MKS, Unit of physical quantities, symbols, Conversion factors, Measurements of mechanical quantities, electrical quantities.
8. **Work Power and Energy:** Definition, Work and its units, Measurements of Work, Work done on bodies moving on horizontal and inclined planes (Consider frictional forces also) Concept of Power and its units, Calculations of Power (Simple cases).
9. **Measurement and measuring instruments:** Measurement of power (1phase and 3 phase, both active and re-active) and energy, 2 wattmeter method of 3 phase power measurement. Measurement of frequency and phase angle. Ammeter and voltmeter (both moving coil and moving iron type), extension of range wattmeter, Multimeters, Megger, Energy meter, AC Bridges, Use of CRO, Signal Generator, CT, PT and their uses.
10. **Sensors and Industrial Instrumentation:** Resistive Capacity, Inductive, piezometric, Half effect sensors and associated signal conditioning circuits, Transducers for industrial instrumentation, Displacement (Linear and Angular).

Technician (Computer Engineering, Computer Applications and Business Administration):

1. Computer Organization and Architecture Binary representation, registers, Instruction set, timing and control, CPU, instruction cycle, addressing modes, CISC, RISC, synchronization, interrupt and exception, privileged and nonprivileged instruction, hierarchical memory organization, memory mapping, cache memory, coherence, consistency, virtual memory, interleaving, DMA, Signed number, fixed and floating point numbers, control unit design, arithmetic and instruction pipelining: throughput, speedup, branch prediction, hazards
2. Programming, Data Structures, Algorithms, and Theory of Computation Programming in C, pointers, basic data structures, array, string, stack, queue, recursion, linear and non-linear data structures, searching and sorting algorithms, complexity and asymptotic analysis, Mealy and Moore machine, finite automata, Determinism and non-determinism, Regular expressions, minimization of deterministic finite automata PDA, regular grammar, CFG, Chomsky's hierarchy, closure properties, pumping lemma, Turing machine, halting problem
3. Operating System and Database Systems Basics of Popular Operating Systems (Linux & Windows), File and Directory Management, purpose of database system, Data Models, ER- Model, Introduction to UML, keys, integrity rules, Relational

Database design, Normalization, Selection and projection, Joins, SQL: data definition, aggregate function, Null Values, nested sub queries, joined relations, ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods

4. Computer Networks and Web technologies Basic of Computer networks; LAN, WAN, OSI reference model, TCP/IP, sliding window protocol, Channel allocations problem, Ethernet, Wireless LAN, Broadband Wireless, routing algorithms, Congestion control algorithms, IPv4 and IPv6, Quality of Service, UDP and TCP, Domain name system, electronic mail, World Wide
5. Web: architectural overview, dynamic web document and http, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet, Concept of Internet, Applications of Internet, Search Engines.

Technician (Chemistry):

1. **Some Basic Concepts of Chemistry:** Importance of Chemistry, Nature of Matter, Properties of Matter and their Measurement, Uncertainty in Measurement, Laws of Chemical Combinations, Dalton's Atomic Theory, Atomic and Molecular Masses, Mole Concept and Molar Masses, Percentage Composition, Stoichiometry and Stoichiometric Calculations.
2. **Structure of Atom:** Discovery of Sub-Atomic Particles, Atomic Models, Developments Leading to the Bohr's Model of Atom, Bohr's Model for Hydrogen Atom, Towards Quantum Mechanical Model of the Atom, Quantum Mechanical Model of Atom
3. **Classification of Elements and Periodicity in Properties:** Why do we Need to Classify Elements? Genesis of Periodic Classifications, Modern Periodic Law and the Present Form of the Periodic Table, Nomenclature of Elements with Atomic Numbers > 100, Electronic Configurations of Elements and the Periodic Table, Electronic Configurations and Types of Elements: s-, p-, d-, f- Blocks, Periodic Trends in Properties of Elements
4. **Chemical Bonding and Molecular Structure:** Kössel-Lewis Approach to Chemical Bonding, Ionic or Electrovalent Bond, Bond Parameters, The Valence Shell Electron Pair Repulsion (VSEPR) Theory, Valence Bond Theory, Hybridization, Molecular Orbital Theory, Bonding in Some Homonuclear Diatomic Molecules, Hydrogen Bonding.
5. **Thermodynamics:** Thermodynamic Terms , Applications, Measurement of ΔU and ΔH : Calorimetry, Enthalpy Change, $\Delta_r H$ of a Reaction – Reaction Enthalpy, Enthalpies for Different Types of Reactions, Spontaneity, Gibbs Energy Change and Equilibrium in Physical Processes, Equilibrium in Chemical Processes – Dynamic Equilibrium, Law of Chemical Equilibrium and Equilibrium Constant, Homogeneous Equilibria, Heterogeneous Equilibria, Applications of Equilibrium Constants , Relationship between Equilibrium Constant K, Reaction Quotient Q and Gibbs Energy G, Factors Affecting Equilibria, Ionic Equilibrium in Solution, Acids, Bases and Salts, Ionization of Acids and Bases, Buffer Solutions, Solubility Equilibria of Sparingly Soluble Salts
6. **Redox Reactions-** Classical Idea of Oxidation and Reduction Reactions, Redox Reactions in Terms of Electron Transfer Reactions, Oxidation Number, Redox Reactions and Electrode Processes
7. **Organic Chemistry – Some Basic Principles and Techniques:** General Introduction, Tetravalence of Carbon: Shapes of Organic Compounds, Structural Representations of Organic Compounds, Classification of Organic Compounds,

- Nomenclature of Organic Compounds, Isomerism, Fundamental Co Classification, Alkanes, Alkenes, Alkynes, Aromatic Hydrocarbon, Carcinogenicity and Toxicity.
- Solutions:** Types of Solutions, Expressing Concentration of Solutions, Solubility, Vapour Pressure of Liquid Solutions, Ideal and Non-ideal Solutions, Colligative Properties and Determination of Molar Mass, Abnormal Molar Masses
 - Electrochemistry:** Electrochemical Cells, Galvanic Cells, Nernst Equation, Conductance of Electrolytic Solutions, Electrolytic Cells and Electrolysis, Batteries, Fuel Cells, Corrosion Chemical Kinetics Rate of a Chemical Reaction, Factors Influencing Rate of a Reaction, Integrated Rate Equations, Temperature Dependence of the Rate of a Reaction, Collision Theory of Chemical Reactions
 - The d-and f-Block Elements:** Position in the Periodic Table, Electronic Configurations of the d-Block Elements, General Properties of the Transition Elements (d-Block), Some Important Compounds of Transition Elements, The Lanthanoids, The Actinoids, Some Ap
 - Coordination Compounds:** Werner's Theory of Coordination Compounds, Definitions of Some Important Terms Pertaining to Coordination Compounds, Nomenclature of Coordination Compounds, Isomerism in Coordination Compounds, Bonding in Coordination Compounds, Bonding in Metal Carbonyls, Importance and Applications of Coordination, Compounds
 - Haloalkanes and Haloarenes:** Classification, Nomenclature, Nature of C–X Bond, Methods of Preparation of Haloalkanes, Preparation of Haloarenes, Physical Properties, Chemical Reactions, Polyhalogen Compounds
 - Alcohols, Phenols and Ethers:** Classification, Nomenclature, Structures of Functional Groups, Alcohols and Ph
 - Aldehydes, Ketones and Carboxylic Acids:** Nomenclature and Structure of Carbonyl Group, Preparation of Aldehydes and Ketones, Physical Properties, Chemical Reactions, Uses of Aldehydes and Ketones, Nomenclature and Structure of Carboxyl Group, Methods of Preparation of Carboxylic Acids, Physical Properties, Chemical Reactions, Uses of Carboxylic Acids Amines Structure of Amines, Classification, Nomenclature, Preparation of Amines, Physical Properties, Chemical Reactions, Method of Preparation of Diazonium Salts, Physical Properties, Chemical Reactions, Importance of Diazonium Salts in Synthesis of Aromatic Compounds
 - Biomolecules:** Carbohydrates, Proteins, Enzymes, Vitamins, Nucleic Acids, Hormones

Technician (Central Workshop):

- Computer awareness: Basic knowledge of Computer Applications, viz; MS Word, MS Excel, Power Point etc. Internet, MS-DOS, Data Entry, Softwares knowledge, applications of computers in mechanical engineering
- Welding Type of welding (Arc welding & gas welding), TIG & MiG welding, Brazing and soldering, welding defects, maintenance of tools and machines
- Turning Basic principle of turning, description and specification of lathe machine, operations of lathe e.g. turning, taper turning, kurling, thread cutting etc., maintenance of lathe.
- Machining Metal cutting principles, cutting tool, basic principles of machining with milling and drilling, shaping machine, grinding etc., machining tool, maintenance of machines.

5. Fitting Functions and working of fitting tools such as files, chisels, scrapers, try squares etc., maintenance of all tools.
6. CNC Operation Components and function of CNC operation, handling of CNC machine.
7. Metrology and Inspection Linear and Angular Measurement, Measurement of Surface Finish and Measurements of Screw threads and Gauges
8. Mechanics of Materials Stresses and Strains, Resilience, Moment of Inertia, Bending Moment and Shearing Force, Bending Stresses, Columns, Torsion and Springs
9. Engineering Materials Scope of Material Science, Crystallography, Metals and Alloys, Heat Treatment, Plastics and Advanced Materials
10. Engineering Mechanics Laws of Forces, Moment, Friction, Centre of Gravity and Simple Machines.

Note:- The Syllabus is suggestive and indicative in nature having only broader areas for reference. The Candidate is expected to have the holistic and expanded knowledge of the subject/syllabus.
