



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	:	Technical Assistant (Level - 6)
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)

Technical Assistant (Civil):

1. **Strength of Materials:** Systems of forces, Centroids & moment of inertia, Mechanical properties of engineering materials - elastic constants, Different types of stresses and strains, Shear force & bending moments in beams, flexural & shear stresses in beams.
2. **Design of Concrete and Steel Structures:** Basics of working stress and limit state method, Analysis & design of simple RCC elements using working stress method, Analysis & design of RCC elements like singly / doubly reinforced rectangular beams - singly reinforced T-beams (Cantilevers, Simply supported/ Continuous beams, Lintels etc.) for shear and flexure by limit state method, Design of One way/ Two way slabs and Staircases by limit state method, Design axially loaded Columns and Footings by limit state method, Design simple Steel members like laterally supported Beams, Tension members, Compression members and Welded connections by limit state method.
3. **Theory of Structures:** Slope and deflection of determinate beams by double integration, Macaulay's method, conjugate beam method, moment area method and unit load method, Analysis of propped cantilevers and fixed beams by Area - Moment method and draw SFD & BMD, Analysis of Continuous beams by Theorem of Three moments, Analysis of continuous beams and Portal frames by Moment Distribution Method and Slope Deflection Method, BMD and SFD for such structures.
4. **Construction Materials and Construction Practice:** Different construction materials and their properties, different types of cement, grades of cements, tests on cement and other construction materials, Types of modern building materials such as ceramic products – glass - metals and plastics, Preparation of mortar and cement concrete, Different types of concretes, Types of foundations, Classification of stone masonry - brick masonry, Types of doors – windows - lintels – stairs, Types of floors – roofs, Different methods of pointing, plastering and termite proofing, Scaffolding - shoring - underpinning - form work, Procedure of colour washing - white washing - painting – varnishing.
5. **Soil Mechanics and Foundation Engineering:** Development of Soil Mechanics - Soil formation - three Phase System - Index and Engineering properties. Compaction and consolidation. Permeability - Darcy's law. Shear strength of soil - Mohr's stress circle - Mohr-Coulomb failure theory - Shear strength test - Unconfined compression test - Optimum moisture content - Proctor's Compaction test. Soil exploration - Direct, Semi-direct and Indirect methods - Spacing and depth of test borings - SubSoil Sampling - Disturbed and Undisturbed samples - Seepage analysis - Head, Gradient and Potential - Hydraulic gradient - Seepage pressure. Methods of determining bearing capacity - Types of failure in soil; Rankine's analysis - Terzaghi's analysis - Effect of water table. Settlement of foundation - Plate load test.
6. **Surveying:** Levelling. Types of Theodolites - Transit and non-transit Theodolite, Vernier and Micrometer Theodolites, Measurement of vertical angle and deflection angle – Bearing of a line – Theodolite traversing. Stadia and Tangential tacheometry –Fixed hair method of tacheometry – Measurement of distance and elevation. Total Station. Countouring.

7. **Transportation Engineering:** Development of Roads in India - Modes of transportation - Nagpur Plan, Classifications of Highways, Highway materials and its evaluation. Types of Pavement - Flexible and Rigid Pavements - Parking - Methods of parking - Road junctions (Grade intersections and Grade separators) - Traffic signals - Types of road signs. Classifications of roads - Earthen road, Gravel road, Water Bound Macadam roads, Types of Bituminous roads - Surface dressing, Methods of construction of cement concrete roads. Rehabilitation and maintenance of roads.
8. **Estimating and Costing:** Types of Estimates - Approximate and Detailed Estimates- Main and Sub Estimates- Revised Estimates-Supplementary Estimates – Maintenance/Repair Estimates. Taking off Quantities. Approximate Estimates – Service Unit method- Plinth Area method- Carpet Area method Cubical Content method. Computation of Areas and volumes of Irregular and irregular Sections - End Ordinate rule, Mid Ordinate rule, Average Ordinate rule, Trapezoidal rule, Simpson's rule. Determination of Volume of Earth work in Embankment / Cutting with level sections of varying heights/ depths. Analysis of Rates - Cement/Lime mortars; Plain Cement Concrete in Foundation/Leveling Course; Flooring with cement concrete, plastered with cement mortar; Flooring with PCC finished with cement concrete surface; Flooring with Cuddapa slabs.
9. **Water Resources Engineering:** Pressure of liquid at a point - Static pressure, Atmospheric pressure, Gauge pressure, Vacuum pressure and Absolute pressure – Measurement of pressure - Simple mercury barometer - Pressure measuring devices and problems - Piezometer tube - Simple U-tube manometer - Differential manometer – Micrometer. Hydrostatic pressure - Pressure on plane surfaces - Horizontal, vertical and inclined Surfaces-Total Pressure-Centre of pressure - Depth of centre of pressure. Various types of flows including Laminar and turbulent flow - Steady and unsteady flow – Uniform and Non-uniform flow - Bernoulli's theorem – Venturimeter – Orificemeter. Large orifice – Discharge formula –Types of mouthpieces - Losses of head in pipes - Types of notches and problems – Classification of weirs - Discharge over a rectangular weir and trapezoidal weir, End contractions of a weir. Rectangular and Trapezoidal channels – Discharge – Chezy's formula, Bazin's formula and Manning's formula - Methods of measurement of velocity. Flow through pipes.
10. **Methods of Irrigation:** Advantages and disadvantages of irrigation, water requirements of crops, factors affecting water requirement, consumptive use of water, water depth or delta and crop relation, Duty of water, relation between delta, duty and base period, Soil crop relationship and soil fertility, sprinkler Irrigation – advantages & limitations, Planning and design of sprinkler irrigation, Drip irrigation – advantages & limitations, suitability.
11. **Canal Irrigation:** Classifications of canals, canal alignment, Inundation canals, Bandhara irrigation, advantages and disadvantages. Silt theories – Kennedy's theory, Lacey's theory, Drawbacks in Kennedy's & Lacey's theories, comparison of Lacey's and Kennedy's theories, Design of unlined canals based on Kennedy & Lacey's theories, suspended and bed loads.

Technical Assistant (Electrical Engineering):

1. **BASIC ELECTRICAL ENGINEERING-** Ohms and Kirchhoff's Laws, star/delta transformation, Network theorems, Power and Energy, Heating effects of Electric current, Magnetic effects, Electromagnetic Induction, Electrostatics, Batteries, Types of Electrical Engineering Materials –Conducting, Semiconducting, Magnetic, Insulating, Di-electric – Properties and Uses.

2. **D.C. MACHINES, BATTERIES & MEASURING INSTRUMENTS** - D.C. Generators, Construction, Operation, types, EMF Equation, Windings, Characteristics, Efficiency and Parallel operation. DC Motors: Principle of operation, Back EMF, Torque Equation, Types, armature reaction. Characteristics, Starters, Speed Control, Losses, Efficiency and Testing, Measuring Instruments, Classification, Principle of Operation of moving Coil, Moving Iron, Dynamometer type, Induction type meters, Instrument Transformers, Induction type Energy meter, Measurement of Resistance, Transducers and Sensors – Types, Thermistor, Thermocouple, Pressure Transducers and Strain gauges, Electronic and Digital Instruments.
3. **A.C. CIRCUITS AND TRANSFORMERS**- A.C. Circuits, Fundamentals, Series and parallel R-L-C Circuits, Resonant circuits, Polyphase Circuits, Measurement of power by 2 Wattmeter's. Transformer, Single-phase Transformer, Construction, Operation, Equivalent circuit, regulation, efficiency, Testing and Parallel operation, Accessories of Transformers and Cooling. Three-phase Transformers, AutoTransformers.
4. **A.C. MACHINES** - Alternators, Construction, Operation, EMF equation, regulation, testing and parallel operation. Synchronous Motors, Operation and performance, effects of Excitation, 'V'- Curve and inverted 'V'- Curve, methods of Starting and uses. Three-Phase induction Motor, Construction, Principle of Operation, Torque Equation, Slip-torque characteristics, losses, efficiency, speed control, starters.
5. **POWER SYSTEM GENERATION & PROTECTION** - Generating Stations, Working, Components, Comparison of Thermal, Hydel, Nuclear and Gas Power stations, Pollution control, Combined Working, Power Stations auxiliaries, Characteristic Curves and Important Terms, types of tariffs, power factor correction and economy. Power Systems, Protection, Circuit Breakers – Types, Principles of operation and uses, Current Limiting reactors, Relays – Classification, Principle of Operation of Induction type over current relay, Directional and Non directional relays, differential relays and distance relays, Protection of alternators, Transformers, Bus-bars, Transmission lines, Lightning arrestors, neutral grounding.
6. **TRANSMISSION AND DISTRIBUTION** - Transmission and distribution, Types of supply systems, Transmission line parameters, inductance and capacitance, performance of short and medium lines, regulation, Ferranti effect, Corona, Basic concepts of HVDC Transmission, Advantage and disadvantages of HVDC Transmission. Components of lines, supports, conductor spacing, ground clearance and sag, insulators, voltage distribution across the string, string efficiency, methods of improving string efficiency. Earthing and layout of sub-stations. Cables – Classification, insulation resistance, specifications. Distribution – Radial and ring distributors, variation of load voltage.
7. **BASIC ELECTRONICS AND DIGITAL ELECTRONICS** - Semi-Conductor devices: N type & P type, Zener diode, PNP and NPN Transistors, Transistor configurations, characteristics, power supplies – half and full wave rectifiers, Filters, Zener diode regulation, Special devices – UJT, FET, LED, SCR, Opto Coupler, Photodiode, Photo Transistor, CRO and Timers. Amplifiers: Types, Principles of operation, Characteristics. Oscillators - Types, operation and application of each. Digital Electronics: Different numbering systems, inter Conversions Boolean Algebra, Logic families, performance of AND, OR, NOT, NOR, NAND gates, combinational Logic Circuits, sequential logic circuits, Resistors and Memories, A/D and D/A converters.
8. **POWER ELECTRONICS AND MICRO CONTROLLER** - Power Electronic Devices, Construction and working of SCR, GTO SCR, DIAC, TRIAC, Volt-ampere characteristics, Triggering of SCR using UJT, Protection. Converters, AC regulators, Choppers, Inverters and Cyclo converters: Types of Converters, working of AC regulators and Choppers. Types of inverters, Principles of working, Basic principle of

working of Cyclo converters. Speed control of D.C. Motors by using converters and choppers, Speed control of induction motor by using AC Voltage regulators – V/F Control, Switched mode power supplies (SMPS), UPS. Micro Controllers: Architecture of 8051, instruction set of 8051, programming concepts, peripheral ICS – Function, features.

Technical Assistant (Computer Engineering):

1. Hardware

- I. Hardware Devices and Troubleshooting
- II. Components, tools and safety measures
- III. Assembling a PC
- IV. Firmware upgrade, Dual BIOS & BIOS settings
- V. Diagnose & Resolve issues related to a PC
- VI. Laptop features, Components, tools and safety measures
- VII. Diagnose & Resolve issues related to a Laptop
- VIII. Upgrading a PC or Laptop
- IX. Smartphone features and Tools & Safety
- X. Types of printers
- XI. Installing and testing a printer
- XII. Printer Maintenance
- XIII. Scanner Installation
- XIV. Webcam Installation.

2. Programming and Data Structure

- I. C Language
- II. Object oriented Programming
- III. functions
- IV. data type
- V. Recursion
- VI. Arrays
- VII. Stacks \Queues
- VIII. Binary Search Trees
- IX. Sorting.

3. Web Designing

- I. HTML and CSS
- II. SQL
- III. JavaScript

4. Operating system

- I. Application & Troubleshooting
- II. Different OS and Compatibility
- III. Windows and Linux installation
- IV. Upgrading OS
- V. Software Installation
- VI. Working on MSWord, Excel & PowerPoint
- VII. MS Office troubleshooting
- VIII. Different Browser setup
- IX. Backup, format & restore OS.

5. Networking and Security

- I. Basics of computer network
- II. OSI Model
- III. Transmission Media
- IV. Networking devices Network Topology
- V. LAN Basics
- VI. IP Addressing
- VII. TCP/IP
- VIII. Ethernet Advanced
- IX. Structured Cabling
- X. Wireless Networking
- XI. Connecting a PC/Laptop to Internet
- XII. Installing a printer and sharing it in network
- XIII. Joining a workgroup/domain
- XIV. File sharing and troubleshooting
- XV. Remote Access
- XVI. Basics of Wi-Fi
- XVII. Internet security.

Technical Assistant (Physics):

1. **Electromagnetic Theory:** Solution of electrostatic and magnetostatic problems including boundary value problems; dielectrics and conductors; Biot-Savart's and Ampere's laws; Faraday's law; Maxwell's equations; scalar and vector potentials; Coulomb and Lorentz gauges; Electromagnetic waves and their reflection, refraction, interference, diffraction and polarization. Poynting vector, Poynting theorem, energy and momentum of electromagnetic waves; radiation from a moving charge.
2. **Atomic and Molecular Physics:** Photoelectric effect, idea of discrete energy levels and electron spin; Franck – Hertz and Stern – Gerlach experiments Significance of four quantum numbers and concept of atomic orbitals; electric dipole transitions and selection rules; X-ray spectra; rotational and vibrational spectra of diatomic molecules; electronic transition in diatomic molecules, Franck-Condon principle; Raman effect; NMR and ESR; lasers.
3. **Solid State Physics:** Elements of crystallography; diffraction methods for structure determination; bonding in solids; elastic properties of solids; defects in crystals; lattice vibrations and thermal properties of solids; free electron theory; band theory of solids; metals, semiconductors and insulators; transport properties; optical, dielectric and magnetic properties of solids; elements of superconductivity.
4. **Nuclear Physics:** Nuclear radii and charge distributions, nuclear binding energy, Electric and magnetic moments; nuclear models, liquid drop model – semi empirical mass formula, Fermi gas model of nucleus, nuclear shell model; nuclear force and two nucleon problem; Alpha decay, Beta-decay, electromagnetic transitions in nuclei; Rutherford scattering, nuclear reactions, conservation laws; fission and fusion; particle accelerators and detectors.
5. **Electronics:** Network analysis; semiconductor devices; Bipolar Junction Transistors, Field Effect Transistors, amplifier and oscillator circuits; operational amplifier, negative feedback circuits, active filters and oscillators; rectifier circuits, regulated power supplies; basic digital logic circuits, sequential circuits, flip-flops, counters, registers, A/D and D/A conversion.

6. **Optics:** Ray Optics: focal length of lenses, magnifying and resolving power of telescopes. Wave optics: Interference, young's double slit experiment, interference in thin films, Newton rings diameter. Diffraction: single slit and N-slit diffraction, diffraction grating. Polarization: Production of polarization. Principles of fiber optics, acceptance angle, acceptance cone, numerical aperture, applications if fiber optics.

Technical Assistant (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.
8. **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

9. **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
10. **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
11. **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
12. **Haloalkanes and Haloarenes:** Classification, Nomenclature, Nature of C–X Bond, Methods of Preparation of Haloalkanes, Preparation of Haloarenes, Physical Properties, Chemical Reactions, Polyhalogen Compounds
13. **Alcohols, Phenols and Ethers:** Classification, Nomenclature, Structures of Functional Groups, Alcohols and Ph
14. **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
15. **Biomolecules:** Carbohydrates, Proteins, Enzymes, Vitamins, Nucleic Acids, Hormones

Technical Assistant (Computer Applications/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 non-privileged 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 engine.

Technical Assistant (Mechanical Engineering and Central Workshop):

1. **Engineering Mechanics:** Laws of Forces, Moment, Friction, Moment of Inertia, Centre of Gravity and Simple
2. **Mechanics of Solids:** Stresses and Strains, Strain energy, toughness, hardness, fatigue, creep Shearing Force Diagrams, Bending Stresses, Columns & Torsion.
3. **Thermodynamics:** Fundamental Concepts, Thermodynamics Laws of Perfect Gases, Laws of Thermodynamics, Ideal and Real Gases and Properties of Steam.
4. **Fluid Mechanics:** Type and Properties of Fluids, Pressure and its Measurement, Flow of Fluids and Flow through Pipes.
5. **Theory of Machines:** Simple Mechanisms, Friction, Power Transmission, gyroscope, Flywheel, Governor and Balancing.
6. **Heat-Transfer:** Modes of Heat Transfer, Fourier's Law, Steady State Conduction, Composite Structures, Natural and Forced Convection and Thermal Radiation.
7. **Machining and Machine Tool Operations:** Cutting Tools and Cutting Materials, Lathe, Drilling, Boring, Shaping and Planning, and Fixtures and Cutting Fluids and Lubricants, Welding, Pattern Making, Metal Forming Process.
8. **Engineering Materials:** Scope of Material Science, Crystallography, Metals and Alloys, Heat Treatment, Advanced Materials.
9. **Machine Design:** Design-Definition, Types of design, necessity of design, Design terminology: stress, strain, factor of safety, factors affecting factor of safety, stress concentration, fatigue, endurance limit, Design of Flange Joints, Design of Flange Coupling and Design of Screwed Joints.
10. **Automobile Engineering:** Automobile and its development, Classification of automobiles, Transmission System, Braking System, Dynamo and Alternator and Exhaust Emissions.
11. **Computer Integrated Manufacturing:** Introduction to NC, CNC & DNC, Construction and Tooling, Part Programming, System Devices, Problems in CNC Machines, Automation and NC Systems.
12. **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.
13. **Metrology and Inspection:** Linear and Angular Measurement, Measurement of Surface Finish and Measurements of Screw threads and Gauges.

14. **Refrigeration and air-conditioning:** Fundamentals of Refrigeration, Vapour Compression System, Refrigerants, Air Refrigeration System, Vapour Absorption System and Refrigeration Equipment.
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 in Machines, their Harmful Effects and Remedies.

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.
