



**RAILWAY RECRUITMENT CELL – WESTERN RAILWAY**  
**PARCEL DEPOT, ALIBHAI PREMJI MARG,**  
**GRANT ROAD (EAST), MUMBAI – 400 007.**  
**WEBSITE : [www.rrc-wr.com](http://www.rrc-wr.com)**

**GDCE NOTIFICATION NO. 0/12023 Dated 31-07-2023**

**NOTICE**

**ALP, TECHNICAIN III – SYLLABUS FOR PART B OF CBT**

1. CBT held on 15-12-2023 by RRB- Kolkata was cancelled vide Railway Board's letter dated 15-03-2024.
2. Railway Board has allowed to conduct CBT at Zonal Railway's level vide letter dated 20-02-2024.
3. In terms of Para III (1) of the Notification, Part B of CBT for the post of ALP, Technician III shall have questions from the trade syllabus prescribed by Director General of Employment & Training (DGET).The matter has been reviewed and it is noted that it is not practically possible to hold examination separately for each trade and therefore four (4 ) groups have been formed for holding the part B of the examination. The groups are as under: i. Mechanical, ii. Electrical, iii. Electronics, iv. (10+2) Physics & Maths. The syllabus for each group is enclosed herewith for information. There is no change in the syllabus for Part A of the examination.
4. Exam Group for Part B of CBT to each eligible employee ( except to those who have already opted for (10+2) Physics & Maths ) is decided at RRC's level and details thereof will be made available shortly on the RRC-WR's website.
5. CBT will be held shortly and employees are advised to be in readiness to appear for CBT.

Encl: ALP, Technician- III : Syllabus for Part B (Annx. 1 to 4)

**Date : - 01-2025**

**APO (RRC)**  
Digitally Signed by संदीप  
भंडारे SANDEEP BHANDARE  
Date: 07-01-2025 18:23:42  
Reason: Approved

## EXAM GROUP- MECHANICAL

## ANNX. 1

Sr.No.	Category	Subcategory/Topics	Key Topics Covered
1	<b>Basic Concepts in Mechanical &amp; Automobile Engineering</b>	Types of Vehicles and Vehicle Classifications Vehicle Structure	Overview of vehicle types and classifications, engine principles Chassis, body design principles, structural components
2	<b>Engine Systems &amp; Components</b>	Petrol and Diesel Engines Engine Operation Fuel Systems Lubrication and Cooling Systems Advanced Engine Systems	Components like pistons, crankshaft, camshaft, cylinder heads Two-stroke and four-stroke engine cycles Fuel injectors, fuel pumps, filters, cooling systems Lubrication techniques, cooling systems for engines Multi-cylinder engines, turbocharging, engine performance tuning
3	<b>Transmission &amp; Power Systems</b>	Gearbox and Clutch Mechanisms Power Transmission Systems Hydraulic Systems	Manual and automatic transmissions, differential systems, PTO (Power Take-Off) Gears, clutches, belts, bearings in mechanical and automobile systems Pumps, cylinders, hydraulic braking and steering systems (including tractor hydraulics)
4	<b>Braking &amp; Safety Systems</b>	Brake Types Suspension Systems Crash Safety Braking Technologies	Disc/drum brakes, ABS, EBD, hydraulic vs. mechanical systems Components, power steering, suspension mechanics Advanced crash safety technologies in vehicle systems Electronic braking systems, regenerative braking in hybrid/electric vehicles
5	<b>Manufacturing and Production Processes</b>	Manufacturing Techniques Machining Processes Assembly & Disassembly Engineering Drawing and CAD Advanced Manufacturing	Automation in automobile production, CNC machining, precision measurement Turning, facing, drilling, boring, and threading in mechanical fabrication Techniques for assembly and disassembly of mechanical and automobile components Basics of mechanical and automotive design drawings, CAD, and CAM systems Advanced automation, CNC, and robotic systems in automobile production

6	<b>Tractor and Agricultural Vehicle Systems</b>	Tractor Basics Tractor Transmission & Clutch Hydraulic and Steering Systems	Types (wheeled/tracked), engine operation, tractor-specific systems Gearboxes, PTO systems, and clutch operation for agricultural vehicles Steering mechanisms and the role of hydraulics in tractor performance
7	<b>Material Science and Strength of Materials</b>	Material Properties Tool Materials and Cutting Techniques Heat Treatment Processes	Stress, strain, and material strength in mechanical and automobile components Selection and application of materials for manufacturing and machining Hardening, tempering, and annealing of mechanical components for durability
8	<b>Fuel Efficiency &amp; Environmental Concerns</b>	Fuel Efficiency Environmental Impact	Hybrid and electric vehicle technology, emission norms, sustainability Technologies for reducing emissions, fuel consumption, eco-friendly vehicle development
9	<b>Safety Practices &amp; Standards</b>	Workplace Safety Machine Safety	Safety standards in mechanical workshops and automobile repair Use of machine tools with safety protocols and maintenance techniques
10	<b>Advanced Topics in Hydraulics, Pneumatics, and Thermodynamics</b>	Advanced Hydraulics Thermodynamics	Applications in mechanical systems, including power steering and braking Heat engines, thermodynamic cycles, refrigeration systems, and their relevance to mechanical and automobile systems
11	<b>Precision Measurement &amp; Tooling</b>	Measurement Tools Tooling & Cutting Tools	Vernier calipers, micrometers, dial gauges, and their use in precision measurements Single-point and multi-point tools, tool materials, and cutting techniques in mechanical machining

Subcategory	Topics
Basic Electrical Principles	Ohm's Law, Kirchhoff's Law, Power, and Energy
Electrical Circuits	Series and Parallel circuits, resistors, capacitors, inductors
Electrical Machines	Types of motors (AC and DC motors), transformers, generators
Wiring and Installation	Types of wires, earthing, wiring regulations
Electrical Measurements	Use of voltmeter, ammeter, wattmeter, multimeter
Power Distribution	Electrical panels, fuses, circuit breakers, protection devices
Instrumentation Basics	Measurement principles, sensors, transducers
Control Systems	Pneumatic and hydraulic control systems, PLCs
Measuring Instruments	Types of instruments (temperature, pressure, flow, and level)
Signal Transmission	Analog vs. digital signals, signal conditioning, transmission
Calibration and Maintenance	Calibration of instruments, maintenance of control systems
Refrigeration Principles	Laws of refrigeration, types of refrigeration systems
Air Conditioning Systems	Types of AC units (split, window, central), cooling and heating
Refrigerants and Oils	Types of refrigerants, oil in ACs, safety measures
Components of AC Systems	Compressors, condensers, evaporators, expansion valves
Installation and Maintenance	Installation of AC units, troubleshooting, servicing
Environmental Considerations	Ozone-depleting substances, energy-efficient technologies
Wiring Systems	Types of wiring (Conduit, PVC, surface, and concealed)
Electrical Installations	Residential, commercial, and industrial wiring
Safety Standards	Electrical safety standards, earthing, grounding techniques
Fuses and Circuit Protection	Functioning and selection of fuses, MCBs, RCCBs
Household Electrical Appliances	Wiring and troubleshooting of common household appliances
Advanced Electrical Theory	Electromagnetic induction, AC theory, power factor
Electric Power Generation	Types of power plants, power transmission, distribution systems
Electrical Machines and Drives	Motors (DC, AC, synchronous), transformers, applications

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Control Systems	PLCs, SCADA systems, control circuits
Protection Systems	Overcurrent protection, differential protection, earth fault
Testing and Commissioning	Testing procedures for electrical systems, commissioning of panels
Electrical System Design	Power system analysis, load flow analysis, protection systems
Power Electronics	Diodes, transistors, rectifiers, inverters, power control devices
Renewable Energy Systems	Solar, wind, hydroelectric systems
Electrical Distribution Networks	High-voltage transmission systems, substations, transformers
Electrical Safety and Standards	International standards, safety protocols, hazard prevention

**EXAM GROUP –ELECTRONICS****ANNX. 3**

<b>Topics</b>
- Basic electrical and electronics fundamentals (Ohm's Law, Kirchhoff's Laws)
- Repair and maintenance of consumer electronics: TV, Refrigerators, Washing Machines,
- Analog and digital circuits: Transistors, Amplifiers, Logic Gates
- Testing instruments: Multimeter, Oscilloscope, Power Supply, and Soldering Techniques
- Radio transmission fundamentals: AM, FM, Demodulation, and Tuning
- TV systems: CRT, LCD, LED technologies, troubleshooting, and repairs
- Audio systems: Microphones, Amplifiers, Speakers, Sound Equalization
- Communication basics: Signal reception, RF circuits, and modulation techniques
- Basic electrical concepts: AC/DC circuits, resistors, capacitors, inductors
- Power electronics: SCR, Triacs, Rectifiers, Voltage Regulators
- Microcontroller basics: 8051 programming, interfacing, and applications
- Analog communication systems: Modulation, Demodulation
- Industrial electronics: Sensors, PLCs, Drives, and Motors
- Advanced electronic systems: Microprocessors (8085, 8086) and their applications
- Embedded systems: Arduino, Raspberry Pi, and IoT applications
- Digital electronics: Counters, Flip-Flops, Logic Gates, and Truth Tables
- Industrial automation: Programmable Logic Controllers (PLC), SCADA basics
- Power electronics: Inverters, Converters, Rectifiers, and UPS systems
- Final project work: Practical-based application and advanced troubleshooting

## PHYSICS SYLLABUS (As per NCERT):

Unit	Subheadings
Unit 1: Physical World and Measurement	Physical World, Units and Measurements
Unit 2: Kinematics	Motion in a Straight Line, Motion in a Plane
Unit 3: Laws of Motion	Newton's Laws
Unit 4: Work, Energy, and Power	Work-Energy Theorem, Power
Unit 5: Motion of System of Particles and Rigid Body	Center of Mass, Rotational Motion
Unit 6: Gravitation	Universal Law of Gravitation, Motion of Satellites
Unit 7: Properties of Bulk Matter	Elasticity, Fluids
Unit 8: Thermodynamics	Laws of Thermodynamics, Heat Engines
Unit 9: Behaviour of Perfect Gas and Kinetic Theory	Gas Laws, Kinetic Theory
Unit 10: Oscillations and Waves	Simple Harmonic Motion, Waves
Unit 11: Electrostatics	Electric Charges and Fields, Electrostatic Potential and Capacitance
Unit 12: Current Electricity	Electric Current, Combination of Resistors, Cells and Batteries
Unit 13: Magnetic Effects of Current and Magnetism	Magnetic Field, Ampere's Law and Applications, Magnetic Properties of Matter
Unit 14: Electromagnetic Waves	Propagation of Electromagnetic Waves
Unit 15: Optics	Reflection and Refraction, Wave Optics
Unit 16: Dual Nature of Matter and Radiation	Photoelectric Effect, Matter Waves
Unit 17: Atoms and Nuclei	Atomic Structure, Nuclear Physics
Unit 18: Electronic Devices	Semiconductors, Applications of Semiconductors

## MATHEMATICS SYLLABUS (As per NCERT)

Unit	Subheadings
UNIT 1: SETS AND FUNCTIONS	Sets, Relations and Functions, Trigonometric Functions

Unit	Subheadings
<b>UNIT 2: ALGEBRA</b>	Principle of Mathematical Induction, Complex Numbers and Quadratic Equations, Linear Inequalities, Permutations and Combinations, Binomial Theorem, Sequence and Series, Matrices, Determinants
<b>UNIT 3: COORDINATE GEOMETRY</b>	Straight Lines, Conic Sections, Introduction to Three-dimensional Geometry
<b>UNIT 4: CALCULUS</b>	Limits and Derivatives, Continuity and Differentiability, Applications of Derivatives, Integrals, Applications of the Integrals, Differential Equations
<b>UNIT 5: MATHEMATICAL REASONING</b>	Mathematically acceptable statements. Connecting words/phrases - consolidating the understanding of “if and only if (necessary and sufficient) condition”, “implies”, “and/or”, “implied by”, “and”, “or”, “there exists” and their use through variety of examples related to real life and Mathematics. Validating the statements involving the connecting words - difference between contradiction, converse and contrapositive.
<b>UNIT 6: STATISTICS AND PROBABILITY</b>	Statistics, Probability
<b>UNIT 7: RELATIONS AND FUNCTIONS</b>	Relations and Functions, Inverse Trigonometric Functions
<b>UNIT 8: VECTORS AND THREE-DIMENSIONAL GEOMETRY</b>	Vectors, Three-dimensional Geometry
<b>UNIT 9: LINEAR PROGRAMMING</b>	Introduction, related terminology such as constraints, objective function, optimization, different types of linear programming (L.P.) problems, mathematical formulation of L.P. problems, graphical method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).