

CSIR-CENTRAL BUILDING RESEARCH
INSTITUTE, ROORKEE

No 76(2)4/2024-Rectt

Dated 18.06.2025

NOTIFICATION TO ADVT NO CSIR-CBRI-5/2025

In continuation of notification to advt No CSIR-CBRI-5/2025 of even no dated 12.06.2025, the revised syllabus for trade test and written test for the **Post Code T 04-25 Mechanic (Machine tools/Maintenance/Refrigeration)** is attached herewith for information of the candidates.

Section Officer (R)

MECHANIC (MACHINE TOOLS/MAINTANANCE/REFRIGERATION) T04-25

TRADE TEST AND WRITTEN TEST

1. Electrical Aspects -

Electrical AC and DC supply, Voltage, Current, Resistance, Power, Energy, Frequency etc.. Materials used as conductors and Insulators. Series and parallel circuit, open circuit, short circuit, etc., measuring instruments such as voltmeter, ammeter, ohm meter, watt meter, energy meter and frequency meter, Earthing and its importance, Insulation and continuity test, principle of Diodes. Rectification, Zener diode as voltage regulator, transistors parameters, ICs, Star and Delta connection, Safety precautions and first aids, firefighting equipment and electrical safety.

2. Welding processes-

Welding processes, oxy fuel gas welding/cutting, brazing & soldering, nozzles, base metal and filler metal, Use of flux, difference between soldering and Brazing in terms of temperatures, filler materials, joint strengths and application, Use of Oxy Acetylene, two stage regulators for brazing/soldering, back fire arrester, Solder - its composition and paste.

3. Basics of refrigeration and Air conditioning -

Fundamentals Thermodynamics law, Science related to refrigeration, work, power, energy, force, Heat and Temperature, Different temperature scales, Thermometers. Units of heat, super heating and sub-cooling, saturation temperature, pressure, types and units. Types of Refrigeration systems, working of vapor compression cycle, Coefficient of Performance (COP), Ton of Refrigeration, fundamental operations, sub cooling and super heating.

4. Types of Refrigerators and their working -

Working of single door direct cool refrigerator, frost free refrigerator, specifications, trouble shooting, Heat Insulation materials, Care and maintenance of refrigerators, Electrical components of refrigerator, Working of Frost Free (2 or 3 door) Refrigerator, temperature control in Freezer & cabinet, automatic defrost system, Function of Electrical accessories like Timer. Heater, Bimetal, Relay, OLP, T/S etc.,

5. Components of Refrigeration system –

Working and application of hermetic compressor, Fixed speed and variable speed compressor like Reciprocating, rotary, scroll, centrifugal Geran, compressor and inverter type. Replications of compressors used in

commercial refrigeration, Volumetric efficiency, Compressor abricant oil, types and properties, types of lubrication methods such as splash, forced feed. AC motors and their types. Advantages of AC motor over DC motor. Split phase induction motors, Common faults, causes and remedies in motors, Function of Starting relay, Capacitors, OLP's in motor. Working principle of three phase induction motor, torque, slip, rotor, frequency and their relation, Squirrel cage induction motor, Importance of phase sequence, Slip ring induction motor. Comparison between SCIM and SRIM. Three phase motor starters such as DOL starter, Star-Delta starter.

6. Function of condenser, types, effect of choked condenser, descaling of air-cooled condenser. Function of drier, its types and application. Types of desiccants, Expansion valve used in domestic refrigeration and ACs,
7. Function, construction, working and Specification of different types of hand tools used in Refrigeration and Air conditioning work. Machineries and equipment used in fittings like drilling machine and grinding machine.

8. Types of refrigerants and their properties

9. Engineering Drawing -

Introduction to Engineering Drawing and Drawing Instruments Conventions, Sizes and layout of drawing sheets. Title Block, Drawing of Geometrical figures: Angle, Triangle, Circle, Rectangle, Square, Parallelogram, Lettering & Numbering. Dimensioning. Types of arrowhead. Leader line with text, Position of dimensioning (Unidirectional, Aligned) Symbolic representation, Concept of axes plane and quadrant, Concept of Orthographic and Isometric projections, Method of first angle and third angle projections, Mensuration Area and perimeter of square, rectangle and parallelogram Area and perimeter of Triangles, Centre of gravity and its practical application, calculating area of cut out regular surfaces and irregular surfaces. Estimation and Costing. Estimation of the requirement of material etc. Reading of Electrical, Electronic & Mechanical Sign and Symbols used in RAC. Sketches of Electrical, Electronic & Mechanical components used in RAC. Reading of Electrical wiring diagram and Layout diagram Drawing of Electrical circuit diagram used in RAC

10 Various types of Machine tools and their maintenance.

Safety aspect related to trade, basic fitting operation viz., marking, filling, sawing, chiseling, drilling tapping & grinding to an accuracy of $\pm 0.25\text{mm}$.

Making different fits viz., sliding, T-fit & square fit with an accuracy $\pm 0.2\text{mm}$ & angular tolerance of 1° . Also shaping and milling operation of different job and produce components by different operations.

11. Maintaining the components of power transmission elements, operation of lathe machine and making of different components, machine foundation and geometrical tests with preventive maintenance of machines viz., lathe, drilling, milling etc.
12. Hydraulic and pneumatic system with advanced electro and pneumatic circuit, preventive and breakdown maintenance of milling and grinding machines.
13. CNC operation including setting operation and part programming in simulator, overhauling of hydraulic press, pumps & compressor, fault finding & breakdown maintenance of machines viz., shaper, grinding, milling machine.