



## **Selection Process for the post of Junior Technical Superintendent [MMAE]**

(Staff Recruitment Advt. No: IITDh/ Admin/SR/26/2023-24 dated 12<sup>th</sup> September 2023)

All the shortlisted candidates are required to appear in person for the Written Test (s) scheduled on 30<sup>th</sup> November 2023 (Thursday). The venue for Written Test (s) is IIT Dharwad, WALMI Campus, Belur Industrial Area, Near High Court Bench, Pune – Bengaluru Road, Dharwad, Karnataka.

Candidates securing minimum qualifying marks as laid down by the selection committee in Written test I shall be shortlisted for Written test II.

The final selection will be based on aggregate marks obtained from both the written tests (I & II) with weightage of 40% in Written Test I and 60% in Written Test II.

### **Examination Pattern:**

#### **Written Test -I (MCQ Type) (40% Weightage)**

Section	Topics/Subjects	Time duration
1	General Ability Test	50 Minutes
2	Technical Questions	

Note: 0.25 Negative Marks for every wrong answer MCQ test.

#### **Written Test-II (60% Weightage)**

Section	Topics/ Subjects	Time Duration
3	Technical	30 Minutes
4	Technical Trade/Skill Test (Pen and Paper) (Questions basically linked to experiments)	80 Minutes

Note: 0.25 Negative Marks for every wrong answer in MCQ questions

### **Syllabus:**

Section	Broad syllabus
1	General Awareness, Reasoning, Quantitative Aptitude, Communication Skills
2 & 3	<b>Thermal Stream:</b> <b>Thermodynamics:</b> Zero, first, and second laws of thermodynamics; thermodynamic properties; reversible and irreversible processes; steady flow energy equation; entropy; thermodynamic cycles; Refrigeration cycles. <b>Fluid Mechanics &amp; Turbomachines:</b> Physical properties of fluids; measurement of pressure; Pascal's law; hydrostatic law; mass conservation; Bernoulli's equation; Flow in pipes; Hydrodynamic force of jets on stationary and moving, inclined, and curved vanes, velocity triangles; work done; efficiency, flow over radial vanes; Different types of pumps and turbines. <b>Heat Transfer:</b> Basic modes of heat transfer and their analysis in different scenarios. <b>Design Stream:</b> <b>Engineering Mechanics:</b> Force Systems; Equilibrium of Rigid Bodies; Trusses And Cables; Friction Laws And Simple Machines; Dynamics;

	<p><b>Strength of Materials:</b> Stress And Strain; Generalized Hooke's Law; Transformation Of Stress And Strain; Bending And Deflection Of Beams; Torsion Of Circular Shafts; Thin-Walled Cylinders And Helical Springs;</p> <p><b>Theory of Machines:</b> Fundamentals And Type Of Mechanisms; Velocity And Acceleration In Mechanisms; Cams And Followers; Belt, Chain And Gear Drives, Brakes And Clutches; Flywheel, Governor And Balancing;</p> <p><b>Machine design:</b> Introduction To Design; Design Of Fasteners; Design Of Shafts, Keys; Design Of Simple Machine Parts L; Design Of Springs, Gears</p> <p><b>Manufacturing Stream:</b></p> <p><b>Workshop Practices:</b> Fitting and carpentry workshop practices on metal casting, forming, sheet metal working, various hand tools &amp; power tools, types of joints &amp; its use.</p> <p><b>Engineering Materials:</b> Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials.</p> <p><b>Forming and Casting Processes:</b> Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy. Different types of castings, design of patterns, molds and cores; solidification and cooling; riser and gating design.</p> <p><b>Joining techniques:</b> arc welding equipment and operator accessories; weld joints and position for arc welding; types of edge preparation; classification of arc welding electrodes; principles of gas welding, arc welding and resistance welding processes. Principles of welding, brazing, soldering and adhesive bonding.</p> <p><b>Machining and Machine Tool Operations:</b> Mechanics of machining; basic machine tools; single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, jigs and fixtures; abrasive machining processes; NC/CNC machines and CNC programming.</p> <p><b>Metrology and Inspection:</b> Limits, fits and tolerances; linear and angular measurements; comparators; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly; concepts of coordinate-measuring machine (CMM).</p> <p><b>Computer Integrated Manufacturing:</b> Basic concepts of CAD/CAM and their integration tools; additive manufacturing.</p>
4	<p>Fitting, Welding, CNC programming, Machining, carpentry, sheet metal, casting, Forging, Machine maintenance, Safety protocol, Drafting, Engg Graphics, Metrology, Material Testing, Thermo-Couple test, Material Characterization, Fluid mechanics, Heat transfer, turbomachinery, IC engines, Strength of Materials, Kinematics, Dynamics of Machines (Including Experiments)</p>