

Syllabus for the Post of Junior Laboratory Assistant (Technical)
School of Mechanical & Materials Engineering-
Materials Science & Engineering Lab
Post Code: 005
Advertisement No. IIT Mandi/Recruit./NTS/2025/05 dated 17.12.2025

There will be two-stage examination.

Stage I: Written Examination (Objective type MCQs)

Stage II: Skill/Trade Test

Syllabus of Stage-I:

Part A- Written Examination

Introductory Materials Science

Structure in materials, amorphous, crystalline and polycrystalline materials, crystalline defects and their significance, point defects and dislocations. Solid Solutions- substitutional and interstitial, phase diagrams of solid solutions. X-ray diffraction, Optical microscope, Scanning electron microscope.

Materials Processing

Heat treatment of metals, Annealing, Recovery, Recrystallization and Grain growth, Types of annealing, Normalizing, Hardening, Tempering, Concept of harden ability, Factors affecting harden ability. Surface hardening methods: carburizing, nitriding, flame hardening and induction hardening.

Mechanical Properties of Materials

Uniaxial stress, strain, engineering and true stress and strain, stress strain diagram, elastic, yielding and plastic behaviour of polycrystalline materials, strengthening by grain size reduction, strain hardening, effect of temperature and creep. Fundamentals of fracture, ductile fracture and brittle fracture.

Electrical, thermal and magnetic Properties of Materials

Energy band structures for conductors, semiconductors and insulators, electrical conductivity, electron mobility, I-V characteristics. Heat capacity, thermal conductivity and thermal expansion. Dielectric Materials and Insulation: polarization and relative permittivity, polarization mechanisms, frequency dependence of dielectric constant, dielectric strength, piezo, ferro and pyro-electricity. Magnetic materials: dia, para, ferro, antiferro and ferrimagnetism. Soft and Hard magnetic materials.

Important Instructions for candidates:

General information about the exam:

- The MCQs have negative marking for wrong answers. The unanswered questions will not be considered for evaluation. (*i.e.*, no marks will be awarded for any question not attempted).
- Only one best-suited answer has to be given for any MCQ. More than one answer will be treated as wrong answer.
- Use of only blue or black ballpoint pen is permitted to answer the questions and fill the form in the exam hall. Use of ink pen/gel pen/pencil/whitener is not permitted.
- Use of calculator, cell phones, log book, periodic table, and any type of electronic device etc., are strictly prohibited.
- The medium of instruction/answers will be English only.
- Involvement in any malpractices will lead to disqualification.
- Any additional instructions given during the selection process must be adhered/complied.

Final Selection:

- Examinations for Stage-I and Stage-II will be conducted for all the candidates or as decided by the selection committee.
- Final selection will be made on the scores obtained in the Stage-I, as the Stage –II is of qualifying nature. But if a candidate fails to qualify in Stage-II, her/his candidature will not be considered further.
- Please note that for consideration in the merit list, a candidate has to secure minimum marks fixed by the selection committee in both exams at Stage-I and Stage-II – failing which institute will not make an offer of appointment even if vacancies go unfilled.