

# Syllabus of the Admission Test for PhD ODD SEM 2024-2025

## Metallurgical and Materials Engineering Department

### Core Subjects:

**Physical metallurgy:** Structure of metals and alloys, Phase diagram, Phase transformation, Heat Treatment, Corrosion and its prevention

**Mechanical Metallurgy:** Theory of elasticity and plasticity, Dislocations, Strengthening mechanism, Creep, Fracture, Fatigue, Metal forming processes, Tensile, hardness and torsion test

**Process Metallurgy:** Iron Making, Steel Making, Environmental management of Metallurgical Industry, Non-ferrous process Metallurgy, Fuel furnace and refractories.

**Thermodynamics & Kinetics of Engineering Materials:** Solution Thermodynamics, Criteria of equilibrium, Concept of entropy and enthalpy, Reaction kinetics.

**Materials Characterization:** Optical microscopy, Electron Microscope, X-Ray Diffraction

**Manufacturing Processes:** Foundry Technology, Casting and solidification, Cast Iron, Powder Metallurgy, Welding Technology.

### Optional Subjects:

1. Computational Materials Science
2. Surface Engineering
3. Composite Materials
4. Ceramic Technology
5. Production of Ferro alloys
6. Functional materials & nanomaterials