



**Department of Materials and Metallurgical Engineering  
IITE, Indus University**

**Syllabus for IURAT exam**

**Metallurgical Thermodynamics:** Laws of thermodynamics, Ellingham and phase stability diagrams, electrochemistry

**Physical Metallurgy:** Chemical Bonding, Crystal Imperfections, Phase transformation (Diffusion and Diffusionless), Electronic, magnetic and optical properties of materials, Basic forms of corrosion and its prevention

**Mechanical Metallurgy:** Dislocation theory, Strengthening mechanisms, Fatigue, Creep

**Manufacturing Processes:** Metal casting, Metal forming, Metal joining, composites fabrication, Surface engineering

**Testing and Characterization:** Destructive testing, Non-destructive testing, Optical and electron microscope, DTA, TGA and DSC

**Futuristic materials:** High entropy alloys, Metallic glass, Nanomaterials, Functionally graded materials, Additive manufacturing