

Metallurgical and Materials Engineering Department
National Institute of Technology Srinagar

NIT/MMED/19/...782

Dated: 17/06/19

Dean Academic

NIT Srinagar

Syllabus for Ph.D Entrance Examination for Metallurgical & Materials Engineering
Department, session July 2019

1.	Classification of Engineering Materials based on Engineering properties, iron carbon equilibrium diagram and the critical phenomenon. Bonding in solids, crystal structure & imperfections. Elasticity, plasticity and strength of materials. Plastic deformation in single crystals. Slip and Twinning mechanisms. Critical resolved shear stress. Strain hardening, recovery, re-crystallization and grain growth. Single crystals, polycrystalline materials and factors affecting their mechanical properties. Yield strength, tensile strength and rupture strength. Ductility and malleability, toughness and hardness of materials. Fatigue - introduction, stress cycle, S-N curve, effect of surface size, stress concentration and metallurgical factors on fatigue properties.
2.	Diffusion in solids, Fick's laws and Kirkendall effect.
3.	Heat treatment - various processes and their applications.
4.	Blast furnace stoves and blast preheating. Physico-Chemical principles involved in direct and indirect reduction of iron.
5.	Steel making by Bessemer and side blown converters O.H and Duplex/Triplex methods, Electric-Arc and Induction processes.

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