

AMR-08 MECHANICAL BEHAVIOUR OF MATERIALS

1. Stress tensor & stress transformation. equations,
2. Principle stresses, Strain tensor & strain transformation equations,
3. Isotropic & anisotropic elasticity, elastic strain energy,
4. Yield criteria & constitutive relationships, work hardening, plastic instability & its significance,
5. Crystallographic aspects of deformation, dislocation theory edge, screw & mixed dislocations,
6. Resistance to dislocation motion & elastic properties of dislocations, dislocation interactions, multiplication of dislocations,
7. Strengthening mechanisms, Creep characteristics of creep curve & steady state creep. mechanisms & creep mechanism maps, creep under complex stress-states,
8. Prediction of long time properties, Fracture toughness & fatigue
9. Griffith's crack theory energy release rate analysis, modes of loading stress analysis of cracks fracture toughness, Low & high cycle fatigue,
10. Fatigue crack initiation & propagation, Structural aspects of fatigue, fatigue under complex stress-states, environmental assisted cracking & fatigue,
11. Some case studies related to design, effect of stricture on strength,
12. Ductility & toughness, mechanical behaviour of metals, ceramics, polymers & composites.

Reference Books:

1. Mechanical Metallurgy, G. E. Dieter (McGraw-Hill)
2. Mechanical Behavior of Materials, Meyers & Chawala (Prentice Hall)