



राष्ट्रीय प्रौद्योगिकी संस्थान राउरकेला

NATIONAL INSTITUTE OF TECHNOLOGY ROURKELA

SYL/001

COURSE SYLLABUS

05 JAN 2020 15:07

Course Details

Subject {L-T-P / C} : MM3202 : Mechanical Properties of Materials {3-0-0 / 3}

Subject Nature : Theory

Coordinator : Dr. Snehanshu Pal

Syllabus

Tensile Behaviour of Metals: True stress-true strain curve, Strain hardening coefficient, Instability in tension, Effect of strain rate and temperature on flow properties. Fracture: Theoretical cohesive strength of metals, Griffith's theory of brittle fracture, Mechanism of brittle and ductile fracture, Fractographic aspects of fracture, Notch effects. Impact Behaviour: Notched bar impact test, Transition temperature phenomenon, Factors affecting transition temperature Fracture Mechanics: Strain energy release rate, Stress intensity factor, Plane strain fracture toughness, Design approach Fatigue: Micromechanisms of crack initiation and growth, Stress and strain approaches of fatigue, Fracture mechanics approach, Fatigue crack growth Environmental Assisted Cracking: Stress corrosion cracking, Hydrogen embrittlement, Corrosion fatigue. Creep: Creep curves, Mechanisms of creep, Stress rapture test, Life prediction, High temperature alloys. Composites: Fracture and fatigue of composites.

Course Objectives

1. Understanding the deformation behaviour of different materials

Course Outcome

Students will be able to design the different materials as per tensile, fatigue, fracture, creep strength of materials. They will also be able to understand the mechanical behaviour of materials under the chemically active environment.

Essential Reading

1. G E Dieter, *Mechanical Metallurgy*, McGraw - Hill Publication
2. R W Hertzberg, *Deformation and Fracture Mechanics of Engineering Materials*, John Wiley & Sons Publication

Supplementary Reading

1. R E Reed, *Physical Metallurgy Principals*, Hill Litton Education Publication

2. W. Soboyejo, *Mechanical Properties of Engineering Materials*, Marcel Dekker Publication

Journal and Conferences

1. Most of the Journals of Materials Science and Engineering A