

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 4

METALLURGY ENGINEERING

Subject Name: MECHANICAL BEHAVIOUR AND TESTING OF MATERIALS

Sr. No.	Course content
1.	Dislocations Properties and sources of dislocations. Dislocation reaction and interactions. Techniques for observation of dislocation.
2.	Elastic and Plastic Deformation Mechanisms of plastic deformation in single crystals and polycrystalline materials. Superplasticity. Strengthening mechanisms in solids. Recovery, recrystallization and grain growth.
3.	Introduction to Material Testing Importance of Material Testing. Classification of various types of testing methods. Selection of testing methods. Importance of calibration of testing instruments. Calibration methods and standards for various tests.
4.	Tensile Testing Engineering stress-strain curve. Tensile properties. True stress-strain curve. Factors affecting tensile properties. Tensile testing machines.
5.	Hardness Testing Various hardness tests. Advantages and limitations of various hardness tests. Microhardness testing.
6.	Impact Testing Types of impact tests and their relative merits and demerits. Ductile-brittle transitions behavior and its significance.

7.	Fatigue Testing S-N curves. Mechanisms of fatigue in metals. Factors affecting fatigue properties.
8.	Creep Testing Typical creep curve. Mechanism of creep deformation in metals. Factors affecting creep behavior.

REFERENCE BOOKS:

- 1 Mechanical Metallurgy
-G. E. Dieter (Pub.-Mc Graw Hill Co.)
- 2 Physical Metallurgy Principles
-Robert E. Reed Hill
- 3 Deformation and Fracture Mechanics of Engineering Materials
-R. W. Hertzberg
- 4 Mechanical Behaviour of Materials
-T. H. Courtney
- 5 Testing of Metallic Materials
-A. V. K. Suryanarayan (Pub.-PHI, New Delhi)