

# GUJARAT TECHNOLOGICAL UNIVERSITY

**SUBJECT NAME: Testing of Metals and Alloys**

**SUBJECT CODE: 2132104**

**B.E. 3<sup>RD</sup> SEMESTER**

**Type of course: Engineering Science**

**Prerequisite: None**

## **Rationale:**

The Successful application of metals in engineering applications relies on the ability of the Metal to meet design and service requirements and to be fabricated under the standard processes to the proper dimensions. The capability of a metal to fulfill these requirements is determined by the mechanical and physical properties of the metal. In this subject, we will understand the different Destructive Tests on Metals to evaluate their Properties & to decide its suitability for the Manufacturing Process & Applications.

## **Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
			ESE (E)	PA (M)		PA (V)		PA (I)		
				PA	ALA	ESE	OEP			
3	0	2	5	70	20	10	20	10	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Sr. No.	Content	Total Hrs	% Weightage
1	<b>Material Testing:</b> Importance, Classification: DT and NDT. Selection of testing methods. Importance of instruments calibration, Calibration methods and standards for various tests.	05	10%
2	<b>Tensile Testing:</b> Engineering stress-strain curve. Tensile properties. True stress-strain curve. Factors affecting tensile properties. Tensile testing machines.	08	18%
3	<b>Hardness Testing:</b> Various hardness tests. Advantages and limitations of various hardness tests. Microhardness testing.	08	18%
4	<b>Impact Testing:</b> Impact tests with their merits and demerits. Ductile-brittle transitions behavior and its significance.	08	18%
5	<b>Fatigue Testing:</b> S-N curves. Mechanisms of fatigue in metals. Factors affecting fatigue properties.	08	18%
6	<b>Creep Testing:</b> Typical creep curve. Mechanism of creep deformation in metals. Factors affecting creep behavior.	08	18%

## **Reference Books:**

1. Testing of Metallic Materials -A. V. K. Suryanarayan (Pub.-PHI, New Delhi)
2. Mechanical Behaviour and Testing of Materials , Jan 2011, Sharma C. P. & Bhargava A. K., PHI.
3. Testing of Metals, Alok Nayar, Mc Graw Hill education

## **Course Outcome:**

After learning the course the students should be able to:

1. Explain concepts and Procedures of various Metal Testing.
2. Able to perform various Destructive Tests on Metals
3. Understand the importance of Calibration of Test equipment
4. Able to select Testing Methods & derive conclusion about the properties of the Metals.

**List of Open Source Software/learning website:**

I. <http://nptel.iitm.ac.in/>

II. <http://wikipedia.com/Destructive> Tests on Metals

**Active learning Assignments (AL) :** Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The Power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU