

Govt. Polytechnic, Mayurbhanj
Session: 2026-27
Lesson Plan

Discipline: Metallurgical Engineering	Semester: 3rd	Name of the Teaching Faculty: Sumeeta Rani Sarap	
Subject: Material Testing (TH-05)	No. of days/per week class allotted: 03	Semester from Date: 01. 07. 2026 to Date: 05.11.2026 No. of weeks: 15	
Week	Class	Module	Lecture Topic
1	1	Unit I	Introduction, importance & objectives
	2		Classification of materials
	3		Standards ASTM, ISO, IS, DIN
2	4		Elastic & plastic deformation
	5		Stress-strain behaviour, Hooke's law
	6		Engineering stress-strain curve
3	7		Yield strength, UTS, fracture strength
	8		Ductility, brittleness, toughness, resilience
	9		Fatigue and creep
4	10		Tutorial/Quiz
	11	Unit II	Introduction to destructive testing
	12		Tensile test principle & UTM
5	13		Engineering stress-strain curve
	14		Modulus, proof stress
	15		True stress & true strain
6	16		True vs engineering relations
	17		Compression test
	18		Compression applications

7	19		Brinell hardness
	20		Rockwell hardness
	21		Vickers hardness
8	22		Mohs hardness
	23		Charpy impact
	24		Izod impact
9	25		Transition temperature
	26		Fatigue testing & S-N curve
	27		Endurance limit & factors
10	28		Creep testing
	29		Fracture mechanics
	30		Failure case studies
11	31	Unit III	Introduction to NDT
	32		Visual inspection
	33		Liquid penetrant test
12	34		Magnetic particle testing
	35		Ultrasonic testing
	36		Radiographic testing
13	37		Eddy current testing
	38		Comparison of NDT methods
	39		Industrial applications
14	40	Unit IV	Nanoindentation
	41		Phased array ultrasonic testing
	42		Quality control
15	43		Material selection
	44		Industrial case studies
	45		Revision & discussion

Course Outcomes:

After completing this course, the student should be able to:

1. Understand Material Behavior: To comprehend the mechanical, physical, and chemical properties of materials and how they respond to various forces, environments, and conditions.
2. Master Testing Techniques: To gain proficiency in conducting different material tests, including destructive and non-destructive methods, and interpreting the resulting data accurately.

3. Apply Testing Principles: To utilize material testing knowledge for material selection, quality control, product design, failure analysis, and ensuring safety and reliability in engineering applications.

Course co-ordinator

HOD
Metallurgy