

Branch Name:	Mechanical Engineering(Production Technology)
Program Code:	ET209
Course Name:	Advanced Engineering Metallurgy - Practical
Course Code:	2ET2090401P
Pre-requisite Course:	Material Science

Course Objectives:

1. To understand the importance of Metallurgy and structure – property correlations.
2. To develop a fundamental understanding of mechanical testing.
3. To familiarize with ferrous and nonferrous metallurgy and phase transformations.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
01	-	-	02	02	-	-	-	-	10	25	10	25	50

Subject Contents:

Sr. No	Detail of Practical	Contact Hours
1	Understanding of basic fundamentals of material science.	04
2	To Study and use of metallurgical microscope.	02
3	Metallographic specimen preparation, mechanical polishing, mounting, and etching.	02
4	Microstructure of annealed pure metals-iron, copper, lead, zinc aluminum and use of specific etchants.	02
5	Comparative study of microstructure of annealed steel (Hypo eutectoid, Eutectoid, Hyper Eutectoid) and variation of hardness.	02
6	To Study about Microstructure of Cast Iron (Gray, White, Nodular).	02
7	To Study about Microstructure of eutectic alloys Al-Si, Pb-Sn, and Pb-Sb.	02
8	To Study about Electro polishing.	02
9	To Study about Microstructure of wrought and annealed single-phase alpha brass & Aluminum.	02
10	To Study about Recovery, Recrystallization and Grain growth of cold worked copper.	02

List of Reference Books:

1. Praymond A. Higgins, Engineering Metallurgy, Part I Applied Physical Metallurgy.
2. G. E. Dieter, Mechanical Metallurgy, Third edition, Tata McGraw-Hill Education.
3. R.E. Reed-Hill, Physical Metallurgy Principles, Cengage Learning.
4. Ghosh A and H.S Ray Principles of Extractive Metallurgy, second edition, New Age International, 1991.
5. William F. Smith, Javed Hashemi, Ravi Prakash, Material Science and Engineering, Fourth edition, McGraw Hill, 2009.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Investigate the relationship between structure of materials and their properties.	2 Understanding 4 Analyze
CLO2	Understand the sub disciplines of metallurgy, its application and structure property correlation.	2 Understanding
CLO3	Develop fundamental understanding of mechanical and metallurgical testing.	3 Applying 6 Creating
CLO4	Develop an understanding about the influence of dislocations and their interactions on the flow behavior of materials and to visualize the importance of dislocations in phenomenon like strain hardening, solid solution strengthening, cold working etc.	2 Understanding 4 Analyze
CLO5	Understand the metallurgy of ferrous and nonferrous materials.	2 Understanding
CLO6	Understand ASTM standards for mechanical testing and its relevance.	2 Understanding 3 Applying

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	M	H		H	M				L					
CLO2	H					L	L			M				
CLO3	M	H		H	H		M	M				L	M	
CLO4	M		L	H	H				M	L	M			H
CLO5	M					M	H	L		M		M	M	
CLO6	M		M	H		M		L		M				M

H:High, M:Medium, L:Low