

ACADEMIC SESSION: WINTER-2026

Discipline : METALLURGICAL ENGINEERING	Semester:3rd	Name of the Teaching Faculty : RUEIGVED MAHANAND Lecturer Stage I
Subject: INTRODUCTION TO MATERIALS ENGINEERING	No. of Days / Week class allotted:3	Semester Duration: 01/07/2026 to 05/11/2026 No. of Weeks :15
Week	Class day	Theory/Practical Topics:
1st	1st	Historical perspective
	2nd	Scope of Materials engineering
	3rd	Processing/Structure/Properties/ Performance Correlations
2nd	1st	Fundamental concepts on atoms
	2nd	Concept on Bonding Forces and Energies
	3rd	Types of Interatomic bonds like Covalent bond, Metallic bond, Ionic bond, Hydrogen bond and Van der waals bond)
3rd	1st	Concept of Crystal and crystallography
	2nd	Concept of Bravais lattices, unit cells
	3rd	Crystal structures (SC, FCC, BCC and HCP)
4th	1st	Point Coordinates, Crystallographic Directions, Crystallographic Planes
	2nd	Concept on Linear and Planar Densities
	3rd	Close-Packed Crystal Structures
5th	1st	Crystal planes and directions, co-ordination number
	2nd	Calculation of APF and Density
	3rd	Point defects {vacancies and self-interstitials)

6 th	1 st	Dislocations—Linear Defects
	2 nd	Interfacial Defects
	3 rd	Bulk or Volume Defects
7 th	1 st	Basic concepts on stress and strain
	2 nd	Deformation and its types
	3 rd	Hooke's Law
8 th	1 st	Electrical Resistivity of Metals
	2 nd	Ohm's Law Electrical Conductivity
	3 rd	Electronic and Ionic Conduction
9 th	1 st	Energy Band Structures in Solids
	2 nd	Electrical Characteristics of Commercial Alloys
	3 rd	Importance of Aluminum Electrical Wires
10 th	1 st	SEMICONDUCTIVITY (intrinsic Semiconduction and Extrinsic Semiconduction)
	2 nd	Factors that Affect Carrier Mobility
	3 rd	Piezoelectricity and its applications
11 th	1 st	Diamagnetism, Paramagnetism, Ferromagnetism, Antiferromagnetism and Ferrimagnetism
	2 nd	Concept on Superconductivity
	3 rd	Electromagnetic Radiation
12 th	1 st	Light Interactions with Solids
	2 nd	Atomic and Electronic Interactions
	3 rd	Refraction, Reflection, Absorption and Transmission
13 th	1 st	Applications of optical phenomena like Luminescence, Photoconductivity, Light-Emitting Diodes
	2 nd	Lasers and Optical Fibers in Communications
	3 rd	Fundamentals of Engineering Materials
14 th	1 st	Classification of Engineering Material
	2 nd	Metal, Polymer, Ceramic
	3 rd	Composite and Electronic material

15 th	1 st	Material Selection
	2 nd	Revision
	3 rd	Revision

Prepared by

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(Lecturer stage 1)

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30/06/2026

HOD

metallurgical engineering

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