

**NM INSTITUTE OF ENGINEERING & TECHNOLOGY
BHUBANESWAR**

Mechanical Engineering Department



Education for a World Stage

**LESSON PLAN
Session 2022-2023**

Semester: 3RD

Subject: ENGINEERING MATERIAL

Faculty Name: AJAYA KUMAR BEURA


Subject: EM

No of Days/per week class allotted: 4

Semester from date: 15/09/2022 to date: 21/01/2023

No. of Weeks: 15

Week	Class Day	Theory topics
1	1	Introduction to Engineering materials and their properties
	2	Classification of Engineering Materials.
	3	Mechanical Properties of Engineering Materials.
	4	Physical & Chemical Properties of Engineering Materials.
2	1	Performance requirements, Material reliability and safety.
	2	Ferrous Materials and alloys
	3	Introduction to Ferrous Materials and alloys.
	4	Characteristics and application of ferrous materials
3	1	Classification, composition and application of low carbon steel, medium carbon steel and High carbon steel.
	2	Alloy steel: Low alloy steel, high alloy steel, tool steel and stainless steel.
	3	Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo,
	4	Introduction to Iron – Carbon system.
4	1	Concept of phase diagram.
	2	Concept of cooling curves.
	3	Types of phase diagrams 1) isomorphous systems 2) eutectic systems
	4	Definition of structures on the Iron Carbon equilibrium phase diagram.
5	1	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel.
	2	Phase transformation in the iron carbon diagram.
	3	Discussion of previous year questions.
	4	Introduction to Crystal imperfections.
6	1	Classification of crystals, crystal and crystal imperfections.
	2	Classification of imperfection: Point defects, line defects.
	3	Classification of imperfection: Surface defects and volume defects
	4	Types and causes of point defects: Vacancies
7	1	Interstitials and impurities.
	2	Types and causes of line defects: Edge dislocation
	3	Types and causes of line defects: Screw dislocation
	4	Edge dislocation Vs. Screw dislocation


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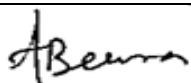
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8	1	Effect of imperfection on material properties.
	2	Deformation by slip and twinning.
	3	Slip Vs. Twinning
	4	Effect of deformation on material properties.
9	1	Discussion of previous year questions related to Crystal imperfections.
	2	Introduction to Heat Treatment.
	3	Purpose of Heat treatment : Annealing
	4	Process of heat treatment: Normalizing.
10	1	Hardening, Tempering.
	2	Stress relieving measures.
	3	Surface hardening: Carburizing
	4	Surface hardening: Nitriding
11	1	Effect of heat treatment on properties of steel.
	2	Hardenability of steel
	3	Discussion of previous year questions related to Heat Treatment.
	4	Introduction to Non-ferrous alloys.
12	1	Introduction to Aluminum alloys
	2	Composition, property and usage of Duralmin.
	3	Composition, property and usage of γ - alloy
	4	Introduction to Copper alloys:
13	1	Composition, property and usage of Copper- Aluminum, Copper-Tin, Babbitt.
	2	Prosperous bronze, brass, Copper- Nickel.
	3	Predominating elements of lead alloys, Zinc alloys and Nickel alloys
	4	Low alloy materials like P-91, P-22 for power plants and other
14	1	Discussion of previous year questions related to Non-ferrous alloys.
	2	Classification, composition, properties and uses of Copper base, Tin
	3	Tin Base, Lead base, Cadmium base bearing materials.
	4	Classification, composition, properties and uses of Iron-base
15	1	Properties and application of thermosetting and
	2	Thermoplastic polymers.
	3	Classification, composition, properties and uses of particulate based and fiber reinforced composites.
	4	Classification and uses of ceramics


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