Discipline : **Mechanical Engg**	Semester :3rd	Name of the Teaching Faculty:- **TIMASWAR MALIK**
Subject: **Engineering Material (Th-3)**	No. of Days/per week class allotted:**04**	Semester From Date :**01.08.2023** To Date:**30.11.2023** No. of Weeks: **15**
Week	**Class Day**	**Theory Topics**
1ST	1ST	**1. Engg Materials and their Properties** Material classification into ferrous and non ferrous category and alloys
	2ND	Material classification into ferrous and non ferrous category and alloys
	3RD	Properties of Materials: Physical , Chemical and Mechanical Performance requirements
	4TH	Properties of Materials: Physical , Chemical and Mechanical Performance requirements
2ND	1ST	Material reliability and safety
	2ND	**2. Ferrous Materials and alloys** Characteristics and application of ferrous materials
	3RD	Classification, composition and application of low carbon steel, medium carbon steel and High carbon steel
	4TH	Alloy steel: Low alloy steel, high alloy steel, tool steel and stainless steel
3RD	1ST	Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo,
	2ND	Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo.
	3RD	**3. Iron-Carbon System** Concept of phase diagram and cooling curves
	4TH	Concept of phase diagram and cooling curves
4TH	1ST	Concept of phase diagram and cooling curves
	2ND	Features of Iron-Carbon diagram with salient micro- constituents of Iron and Steel
	3RD	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
	4TH	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
5TH	1ST	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
	2ND	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
	3RD	**4. Crystal Imperfections** Crystal defines, classification of crystals, ideal crystal and crystal imperfections
	4TH	Crystal defines, classification of crystals, ideal crystal and crystal imperfections
6TH	1ST	Classification of imperfection: Point defects, line defects, surface defects and volume defects
	2ND	Classification of imperfection: Point defects, line defects, surface defects and volume defects
	3RD	Types and causes of point defects: Vacancies, Interstitials and

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		impurities
	4TH	Types and causes of line defects: Edge dislocation and screw dislocation
7TH	1ST	Effect of imperfection on material properties
	2ND	Deformation by slip and twinning
	3RD	Effect of deformation on material properties
	4TH	Effect of deformation on material properties
8TH	1ST	**5. Heat Treatment** Purpose of Heat treatment
	2ND	Process of heat treatment: Annealing, normalizing, hardening, tampering, stress relieving measures
	3RD	Process of heat treatment: Annealing, normalizing, hardening, tampering, stress relieving measures
	4TH	Process of heat treatment: Annealing, normalizing, hardening, tampering, stress relieving measures
9TH	1ST	Surface hardening: Carburizing and Nitriding
	2ND	Surface hardening: Carburizing and Nitriding
	3RD	Effect of heat treatment on properties of steel
	4TH	Effect of heat treatment on properties of steel
10TH	1ST	Hardenability of steel
	2ND	Hardenability of steel
	3RD	**6. Non Ferrous Alloys** Aluminum alloys: Composition, property and usage of Duralumin, Y- alloy.
	4TH	Aluminum alloys: Composition, property and usage of Duralumin, Y- alloy
11TH	1ST	Aluminum alloys: Composition, property and usage of Duralumin, Y- alloy
	2ND	Copper alloys: Composition, property and usage of Copper-Aluminum, Copper-Tin, Babbit , Phosperous bronze, brass, Copper- Nickel
	3RD	Copper alloys: Composition, property and usage of Copper-Aluminum, Copper-Tin, Babbit , Phosperous bronze, brass, Copper- Nickel
	4TH	Predominating elements of lead alloys, Zinc alloys and Nickel alloys
12TH	1ST	Predominating elements of lead alloys, Zinc alloys and Nickel alloys
	2ND	Low alloy materials like P-91, P-22 for power plants and other high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc.
	3RD	Low alloy materials like P-91, P-22 for power plants and other high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc.
	4TH	Low alloy materials like P-91, P-22 for power plants and other high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc.
13TH	1ST	**7. Bearing Material** Classification, composition, properties and uses of Copper base, Tin Base, Lead base, Cadmium base bearing materials
	2ND	Classification, composition, properties and uses of Copper base, Tin Base, Lead base, Cadmium base bearing materials
	3RD	Classification, composition, properties and uses of Copper

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		base, Tin Base, Lead base, Cadmium base bearing materials
	4TH	**8. Spring Materials** Classification, composition, properties and uses of Iron-base and Copper base spring material
14TH	1ST	Classification, composition, properties and uses of Iron-base and Copper base spring material
	2ND	Classification, composition, properties and uses of Iron-base and Copper base spring material
	3RD	**9. Polymers** Properties and application of thermosetting and thermoplastic polymers
	4TH	Properties and application of thermosetting and thermoplastic polymers
15TH	1ST	Properties of Elastomers
	2ND	**10. Composites & Ceramics** Classification, composition, properties and uses of particulate based and fiber reinforced composites
	3RD	Classification, Composition, Properties and uses of particulate based and fiber reinforced composites
	4TH	Classification and uses of Ceramics

Learning Resources:

- A Textbook of Material Science and Metallurgy, by O. P. Khanna, Dhanpat Rai
- Engineering materials and Metallurgy by R .K. Rajput, S. Chand
- Material Science & Process by S. K. Hazra choudhry, Indian Book Distrubuting

Prepared By TMalik 23/11/23

TIMASWAR MALIK

Lecturer Mechanical Engg Deptt

G.I.E.T (Polytechnic), Jagatpur, Cuttack

23/11/23

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GIET (Polytechnic)
Jagatpur, Cuttack