

Discipline : Mechanical Engg	Semester : 3rd	Name of the Teaching Faculty:- RASHMI RANJAN LENKA
Subject: Engineering Material (Th-3)	No. of Days/per week class allotted: 04	Semester From Date : 15.09.2022 To Date: 22.12.2022 No. of Weeks: 15
Week	Class Day	Theory / Practical 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

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

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

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