

**GOVERNMENT POLYTECHNIC JAJPUR**

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**DEPARTMENT OF MECHANICAL ENGINEERING(2022-2023)**

**LESSON PLAN (2022-2023)**

Discipline: Mechanical	Semester: 3RD	Name of the Teaching faculty: KEDARNATH JENA
Subject: Engineering Material (Th-3)	No of Days/ Week class alloted: 4	Semester from Date: 15.19.2022 To Date: 22.01.2023 No of weeks: 15
<b>Week</b>	<b>Class Day</b>	<b>Topics</b>
1st	4th	<b>CH.1 Engineering materials and their properties.</b>
		Material classification into ferrous and non ferrous category and alloys
2nd	1st	Properties of Materials: Physical properties
	2nd	Properties of Materials: Chemical properties.
	3rd	Properties of Materials: Mechanical properties.
	4th	Properties of Materials: Mechanical properties.
3rd	1st	Performance requirements and Material reliability and safety
	2nd	<b>CH.2 Ferrous materials and alloys.</b>
		Characteristics and application of ferrous materials and classification of low carbon steel.
		Composition and application of low carbon steel.
4th	Classification, composition and application of medium carbon steel.	
4th	1st	Classification, composition and application of high carbon steel.
	2nd	Alloy steel: Low alloy steel, high alloy steel, tool steel and stainless steel
	3rd	Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo.
	4th	<b>CH. 3 Iron- Carbon System.</b>
Concept of phase diagram		
5th	1st	Concept of phase diagram
	2nd	Concept of cooling curves
	3rd	Concept of cooling curves
	4th	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
6th	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	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel

		<b>CH. 4. Crystal Imperfections.</b>
	4th	Crystal defines, classification of crystals, ideal crystal and crystal imperfections
7th	1st	Classification of imperfection: Point defects, line defects
	2nd	surface defects and volume defects
	3rd	Types and causes of point defects: Vacancies, Interstitials and impurities
	4th	Interstitials and impurities
8th	1st	Types and causes of line defects: Edge dislocation and screw dislocation.
	2nd	Effect of imperfection on material properties
	3rd	Deformation by slip and twinning
	4th	Effect of deformation on material properties
9th	1st	CLASS TEST 1
	2nd	<b>CH. 5. Heat treatment.</b>
		Purpose of Heat treatment
		Process of heat treatment: Annealing, normalizing, hardening
4th	Process of heat treatment: Annealing, normalizing, hardening	
10th	1st	Tampering, stress relieving measures
	2nd	Tampering, stress relieving measures
	3rd	Surface hardening: Carburizing and Nitriding
	4th	Surface hardening: Carburizing and Nitriding
11th	1st	Effect of heat treatment on properties of steel
	2nd	Effect of heat treatment on properties of steel
	3rd	Hardenability of steel
	4th	<b>CH. 6. Non-ferrous alloys.</b>
Aluminum alloys: Composition, property and usage of Duralmin, $\gamma$ - alloy		
12th	1st	Copper alloys: Composition, property and usage of CopperAluminum, Copper-Tin alloy.
	2nd	Copper alloys: Babbit , Phosperous bronze, brass, Copper- Nickel alloy.
	3rd	Predominating elements of lead alloys, Zinc alloys and Nickel alloys .
	4th	Low alloy materials like P-91, P-22 for power plants and other high temperature services.
13th	1st	High alloy materials like stainless steel grades of duplex, super duplex materials etc.
	2nd	<b>CH. 7. Bearing Material.</b>
		Classification, composition, properties and uses of Copper base, Tin Base bearing material.
3rd	Classification, composition, properties and uses of Lead base, Cadmium base bearing materials.	

	4th	<b>CH. 8. Spring materials:</b> Classification, composition, properties and uses of Iron base spring material.
14th	1st	Classification, composition, properties and uses of Copper base spring material
	2nd	<b>CH. 9. Polymers :</b> Properties and application of thermosetting polymers.
	3rd	Polymers : Properties and application thermoplastic polymers and properties of elastomers.
	4th	<b>CH. 10. Composites and Ceramics.</b> Classification, composition, properties and uses of particulate based composites.
15th	1st	Classification, composition, properties and uses of fiber reinforced composites.
	2nd	Classification and uses of ceramics.
	3rd	Classification and uses of ceramics.
	4th	Previous year question discussion.
16th	1st	Previous year question discussion.
	2nd	Previous year question discussion.
	3rd	CLASS TEST 2

**Learning resources:**

Sl. No.	Author	Title of the book	Publisher
01	O P Khanna	A Textbook of Material Science and Metallurgy	Dhantpat Rai
02	R K Rajput	Engineering materials and Metallurgy	S.Chand
03	S K Hazra choudhry	Material science & process	Indian Book Distributing

*KAC*  
15.09.22  
Signature of Faculty