


Discipline: MECHANICAL	Semester: 3rd	Name of the Teaching Faculty: <u>Rakesh K. Rout</u> PTGF : Mechanical
Subject: EM	No. of days/per week class allotted: 4	Semester From date: <u>15-9-22</u> To date: No of weeks: 15
Week	Class Day	Theory Topics:
1st	1st	Introduction of Engineering materials .
	2nd	Material classification into ferrous and non ferrous category and alloys.
	3rd	Properties of Materials: Physical , Chemical and Mechanical
	4th	Performance requirements
2nd	1st	Material reliability and safety
	2nd	Introduction of Ferrous Materials and alloys
	3rd	Characteristics and application of ferrous materials
	4th	Classification, composition and application of low carbon steel
3rd	1st	Medium carbon steel and 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	Introduction of Iron – Carbon system
4th	1st	Concept of phase diagram
	2nd	Concept of cooling curves
	3rd	Features of Iron-Carbon diagram
	4th	salient micro-constituents of Iron and Steel
5th	1st	Introduction of Crystal imperfections
	2nd	Crystal defines, classification of crystals
	3rd	Ideal crystal and crystal imperfections
	4th	Classification of imperfection: Point defects, line defects


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Surface defects and volume defects	
1 st	Types and causes of point defects: Vacancies, Interstitials and impurities
2 nd	Types and causes of line defects: Edge dislocation and screw dislocation
3 rd	Effect of imperfection on material properties
4 th	Deformation by slip and twinning
1 st	Effect of deformation on material properties
2 nd	
3 rd	Introduction of Heat Treatment
4 th	Purpose of Heat treatment
1 st	Process of heat treatment: Annealing, normalizing
2 nd	Process of heat treatment: hardening, tempering
3 rd	Surface hardening: Carburizing
4 th	Surface hardening: Nitriding
1 st	Effect of heat treatment on properties of steel
2 nd	Hardenability of steel
3 rd	Introduction of Non-ferrous alloys
4 th	Aluminum alloys: Composition, property
1 st	usage of Duralmin, γ - alloy,
2 nd	Copper alloys: Composition, property
3 rd	usage of Copper- Aluminum, Copper-Tin
4 th	Babbitt, Phosphorous bronze, brass, Copper- Nickel

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11 th	1 st	Predominating elements of lead alloys
	2 nd	Zinc alloys and Nickel alloys
	3 rd	Low alloy materials like P-91, P-22 for power plants
	4 th	other high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc.
12 th	1 st	Introduction of Bearing Material
	2 nd	Classification, composition, properties of bearing material.
	3 rd	uses of Copper base, Tin Base, Lead base, Cadmium base bearing materials.
	4 th	Introduction of Spring materials:
	1 st	Classification, composition, properties
	2 nd	uses of Iron base and Copper base spring material.
13 th	3 rd	Introduction of Polymers
	4 th	Properties and application of thermosetting
	1 st	Application of thermoplastic polymers and Properties of elastomers
14 th	2 nd	Introduction of Composites and Ceramics
	3 rd	Classification, composition, properties
	4 th	uses of particulate based and fiber reinforced composites.
	1 st	Classification and uses of ceramics.
	2 nd	Revision class.
15 th	3 rd	Discussion of PYQ
	4 th	Discussion of PYQ

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