



GOVERNMENT POLYTECHNIC, KORAPUT

DEPARTMENT OF MECHANICAL ENGINEERING

Discipline:
**MECHANICAL
ENGG**

Semester:
3RD

Name of the Teaching Faculty: **MANOJA KUMAR SAHU.**

Subject:
**ENGINEERING
MATERIALS**

No. of days/per week class allotted: **4**

Semester From date: **1/8/23** To Date: **30/11/23**

No. of Weeks: **15**

COURSE OUTCOMES

- CO1:** Understand requirement of material for engineering and their different properties.
CO2: Understand classification of material and their composition and application.
CO3: Understand Iron-carbon equilibrium system with different phase diagram.
CO4: Understand crystal classification and defect.
CO5: Understand heat treatment process and requirement.
CO6: Understand the evolution of engineering materials.
CO7: Understand application of engineering materials.

Week	Class Day	Theory/Practical Topics
1 ST	1 ST	MATERIAL CLASSIFICATION INTO FERROUS AND NON FERROUS CATEGORY AND ALLOYS.
	2 ND	PROPERTIES OF MATERIALS: PHYSICAL, CHEMICAL AND MECHANICAL.
	3 RD	PERFORMANCE REQUIREMENTS.
	4 TH	MATERIAL RELIABILITY AND SAFETY.
2 ND	1 ST	ASSIGNMENT - I
	2 ND	CHARACTERISTICS AND APPLICATION OF FERROUS MATERIALS.
	3 RD	CLASSIFICATION, COMPOSITION AND APPS. OF LOW CARBON STEEL, MEDIUM CARBON STEEL AND HIGH CARBON STEEL
	4 TH	ALLOY STEEL: LOW ALLOY STEEL, HIGH ALLOY STEEL, TOOL STEEL AND STAINLESS STEEL
3 RD	1 ST	TOOL STEEL: EFFECT OF VARIOUS ALLOYING ELEMENTS SUCH AS CR, MN, NI, V, MO.
	2 ND	ASSIGNMENT - II
	3 RD	CONCEPT OF PHASE DIAGRAM.
	4 TH	CONCEPT OF PHASE DIAGRAM (CONTD...)
4 TH	1 ST	CONCEPT OF COOLING CURVES.
	2 ND	CONCEPT OF COOLING CURVES. (CONTD...)
	3 RD	FEATURES OF IRON-CARBON DIAGRAM.
	4 TH	FEATURES OF IRON-CARBON DIAGRAM (CONTD...)
5 TH	1 ST	SALIENT MICRO-CONSTITUENTS OF IRON AND STEEL OF IRON-CARBON DIAGRAM.
	2 ND	ASSIGNMENT - III
	3 RD	CRYSTAL DEFINES, CLASSIFICATION OF CRYSTALS, IDEAL CRYSTAL AND CRYSTAL IMPERFECTIONS.
	4 TH	CLASSIFICATION OF IMPERFECTION: POINT DEFECTS, LINE DEFECTS, SURFACE DEFECTS AND VOLUME DEFECTS.
6 TH	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.

7 TH	3 RD	EFFECT OF IMPERFECTION ON MATERIAL PROPERTIES
	4 TH	DEFORMATION BY SLIP AND TWINNING.
	1 ST	DEFORMATION BY SLIP AND TWINNING. (CONTD...)
	2 ND	EFFECT OF DEFORMATION ON MATERIAL PROPERTIES.
	3 RD	EFFECT OF DEFORMATION ON MATERIAL PROPERTIES. (CONTD...)
8 TH	4 TH	QUIZ & ASSIGNMENT - IV
	1 ST	PURPOSE OF HEAT TREATMENT.
	2 ND	PROCESS OF HEAT TREATMENT: ANNEALING, NORMALIZING, HARDENING, TAMPERING, STRESS RELIEVING MEASURES.
9 TH	3 RD	PROCESS OF HEAT TREATMENT: ANNEALING, NORMALIZING, HARDENING, AND TAMPERING, STRESS RELIEVING MEASURES. (CONTD...)
	4 TH	SURFACE HARDENING: CARBURIZING AND NITRIDING.
	1 ST	SURFACE HARDENING: CARBURIZING AND NITRIDING (CONTD...)
10 TH	2 ND	EFFECT OF HEAT TREATMENT ON PROPERTIES OF STEEL.
	3 RD	EFFECT OF HEAT TREATMENT ON PROPERTIES OF STEEL. (CONTD...)
	4 TH	HARDENABILITY OF STEEL.
	1 ST	REVISION.
11 TH	2 ND	QUIZ & ASSIGNMENT - V
	3 RD	ALUMINUM ALLOYS: COMPOSITION, PROPERTY AND USAGE OF DURALMIN, Y- ALLOY.
	4 TH	ALUMINUM ALLOYS: COMPOSITION, PROPERTY AND USAGE OF DURALMIN, Y- ALLOY. (CONTD...)
	1 ST	COPPER ALLOYS: COMPOSITION, PROPERTY AND USAGE OF COPPERALUMINUM, COPPER-TIN, BABBIT , PHOSPEROUS BRONZE, BRASS, COPPER- NICKEL.
12 TH	2 ND	COPPER ALLOYS: COMPOSITION, PROPERTY AND USAGE OF COPPERALUMINUM, COPPER-TIN, BABBIT , PHOSPEROUS BRONZE, BRASS, COPPER- NICKEL. (CONTD...)
	3 RD	PREDOMINATING ELEMENTS OF LEAD ALLOYS, ZINC ALLOYS AND NICKEL ALLOYS.
	4 TH	PREDOMINATING ELEMENTS OF LEAD ALLOYS, ZINC ALLOYS AND NICKEL ALLOYS (CONTD....)
	1 ST	LOW ALLOY MATERIALS LIKE P-91, P-22 FOR POWER PLANTS AND OTHER 10 HIGH TEMPERATURE SERVICES. HIGH ALLOY MATERIALS LIKE STAINLESS STEEL GRADES OF DUPLEX, SUPER DUPLEX MATERIALS ETC.
13 TH	2 ND	LOW ALLOY MATERIALS LIKE P-91, P-22 FOR POWER PLANTS AND OTHER 10 HIGH TEMPERATURE SERVICES. HIGH ALLOY MATERIALS LIKE STAINLESS STEEL GRADES OF DUPLEX, SUPER DUPLEX MATERIALS ETC. (CON..)
	3 RD	REVISION
	4 TH	QUIZ & ASSIGNMENT - VI
	1 ST	CLASSIFICATION OF COPPER BASE, TIN BASE, LEAD BASE, CADMIUM BASE BEARING MATERIALS.
14 TH	2 ND	COMPOSITION OF COPPER BASE, TIN BASE, LEAD BASE, CADMIUM BASE BEARING MATERIALS.
	3 RD	PROPERTIES & USES OF COPPER BASE, TIN BASE, LEAD BASE, CADMIUM BASE BEARING MATERIALS.
	4 TH	CLASSIFICATION OF IRONBASE AND COPPER BASE SPRING MATERIAL.
	1 ST	COMPOSITION OF IRONBASE AND COPPER BASE SPRING MATERIAL.
14 TH	2 ND	PROPERTIES & USES OF IRONBASE AND COPPER BASE SPRING MATERIAL.
	3 RD	PROPERTIES OF THERMOSETTING AND THERMOPLASTIC

15 TH		POLYMERS.
	4 TH	APPLICATIONS OF THERMOSETTING AND THERMOPLASTIC POLYMERS.
	1 ST	PROPERTIES OF ELASTOMERS.
	2 ND	CLASSIFICATION & COMPOSITION OF PARTICULATE BASED AND FIBER REINFORCED COMPOSITES
	3 RD	PROPERTIES AND USES OF PARTICULATE BASED AND FIBER REINFORCED COMPOSITES.
	4 TH	CLASSIFICATION AND USES OF CERAMICS.

LEARNING RESOURCES:

- 01 O.P KHANNA A TEXTBOOK OF MATERIAL SCIENCE AND METALLURGY DHANPAT RAI.
- 02 R.K RAJPUT ENGINEERING MATERIALS AND METALLURGY S.CHAND.
- 03 S.K HAZRA CHOUDHRY MATERIAL SCIENCE & PROCESS INDIAN BOOK DISTRIBUTING.

AKh
10/8/23

Sign. Of Faculty concerned

S.K. Hazra
10/8/23

Sign. Of HOD /C

Principal