GOVT.POLYTECHNIC NAYAGARH

DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

SUBJECT: MATERIAL SCIENCE & ENGINEERING (TH-3)

PERIODS: 3P/WEEK **SEMESTER:** 3rd

NAME OF FACULTY: ABINAS NAYAK, LECTURER STAGE I

SEMESTER FROM :14/07/2025 to 15/11/2025 **NO. OF WEEKS:** 15

Sl. No.	Week	Day	Topics To Be Covered
1	1st	1st day	UNIT-I: Crystal structures and Bonds
		2nd day	Unit cell and space lattice, Crystal systems
		3rd day	Crystal structure: BCC, FCC and HCP
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
2	2nd	1st day	Coordination number for SC, BCC and FCC
		2nd day	Atomic radius: definition and calculations
		3rd day	Atomic Packing Factor for SC, BCC, FCC and HCP
Sl. No	**Week**	**Day**	**Topics To Be Covered**
3	3rd	1st day	Simple problems on number of atoms in a unit cell
		2nd day	Classification of bonds: primary & secondary
		3rd day	Types of primary bonds: Ionic, Covalent, Metallic
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
4	4th	1st day	Types of secondary bonds
		2nd day	UNIT-II: Phase diagrams, Ferrous metals
		3rd day	Isomorphs, eutectic and eutectoid systems
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
5	5th	1st day	Iron-Carbon binary diagram
		2nd day	Flow sheet for production of iron and steel
		3rd day	Pig iron: classification, composition, impurities
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
6	6th	1st day	Cast Iron: classification, composition, properties, uses
		2nd day	Wrought Iron: properties and uses
		3rd day	Comparison of CI, Wrought Iron, Mild & High C Steel
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
7	7th	1st day	Standard commercial grades of steel (BIS, AISI)
		2nd day	Alloy Steels – purpose & effects of alloying elements
		3rd day	Important alloy steels: Si steel, HSS

Sl. No.	Week	Day	Topics To Be Covered
8	8th	1st day	Heat resisting steel, spring steel
		2nd day	Stainless Steel: types and applications
		3rd day	UNIT-III: Non-ferrous metals and its Alloys
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
9	9th	1st day	Properties and uses of Al, Cu, Sn, Pb, Zn, Mg, Ni
		2nd day	Copper alloys: Brasses – composition, properties, uses
		3rd day	Copper alloys: Bronzes – composition, properties, uses
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
10	10th	1st day	Aluminum alloys: Duralumin, Hindalium
		2nd day	Nickel alloys: Inconel, Monel
		3rd day	Anti-friction/Bearing alloys & BIS/ASME grades
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
11	11th	1st day	UNIT-IV: Failure analysis & Testing
		2nd day	Fracture: ductile fracture, brittle fracture
		3rd day	Fatigue, endurance limit, creep
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
12	12th	1st day	Destructive testing: Tensile, compression testing
		2nd day	Hardness testing: Brinell, Rockwell
		3rd day	Bend test, torsion test, fatigue test
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
13	13th	1st day	Non-destructive testing: Visual, Magnetic particle
		2nd day	Liquid penetrant test, Ultrasonic inspection
		3rd day	Radiography
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
14	14th	1st day	UNIT-V: Corrosion & Surface Engineering
		2nd day	Nature of corrosion, Electro chemical reactions
		3rd day	Types of corrosion & corrosion control methods
Sl. No.	**Week**	**Day**	**Topics To Be Covered**
15	15th	1st day	Surface engineering: Coatings & treatments
		2nd day	Electroplating, PVD, CVD
		3rd day	Doubt clearance and Revision

References:

1. Material Science-R.S.Khurmi,R,S.Sedha-S.Chand,Publication
2. Material Science and Metallurgy –D.S.Nutt-S.K,Katariya and Sons,New Delhi
3. Material Science and Engineering -V.Raghavan-EEE Edition, Prentice Hall, New Delhi

Abinas Nayak 11/8/25

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(Lecturer Stage I)