

# KIIT POLYTECHNIC, BHUBANESWAR

## LESSON PLAN

Session:-2022-23

<b>Discipline : Metallurgy</b>	<b>Semester:4th Summer:-2022</b>	<b>Name of the Teaching Faculty:Pramod kumar sethi Sr.Lecture.</b> Email Id :- pksehifmt@kp.kiit.ac.in
Subject: Physical Metallurgy(Th-2)	No. Of Days/Week:-5	Starting date:13/02/2023 Ending date :- 23/05/2023
<b>Week</b>	<b>Class Day</b>	<b>Theory Topics</b>
1st	1st	Define crystal and crystallography.
	2nd	Define space lattice and unit cell.
	3rd	Compare different types of crystal lattice,bravis lattice, and primitive lattice.
	4th	Define with sketch B.C.C, F.C.C and H.C.P.
	5th	Define Miller indices, planes, and directions.
2nd	1st	Define isotropy and anisotropy in materials.
	2nd	Define imperfections in metallic materials.
	3rd	Differentiate between types of imperfections: point defect, line defect, surface defect, and volume defect.
	4th	Differentiate between types of imperfections: point defect, line defect, surface defect, and volume defect
	5th	Define alloys and solid solution.
3rd	1st	Define solidification and crystallization
	2nd	Discussion on possible questionnaire
	3rd	Explain role of free energy thermodynamic potential in Conversion of liquid to solid.
	4th	Explain role of free energy thermodynamic potential in Conversion of liquid to solid.
	5th	Define super cooling, under cooling, degree of super Cooling.
4th	1st	Explain mechanism of solidification /crystalisation.nucleation, critical size nucleus, spontaneous nucleation, relation between nucleation and grain growth.

	2nd	Explain mechanism of solidification /crystallisation.nucleation, critical size nucleus, spontaneous nucleation, relation between nucleation and grain growth.
	3rd	Discuss shape of crystals and solidification of ingot.
	4th	Quiz Test
	5th	Discussion on possible questionnaire.
5th	1st	Define equilibrium diagram.
	2nd	Discuss the importance of equilibrium diagram.
	3rd	Draw equilibrium diagram of binary alloys.
	4th	State types equilibrium diagram.
	5th	Explain isomorphism equilibrium diagram with Examples.
6th	1st	Explain isomorphism equilibrium diagram with examples.
	2nd	Explain eutectic and eutectoid type equilibrium diagram with examples.
	3rd	Discussion on possible questionnaire
	4th	Explain peritectic and peritectoid type equilibrium diagram with examples.
	5th	Explain peritectic and peritectoid type equilibrium diagram with examples.
7th	1st	Define phase rule, lever rule.
	2nd	Apply phase rule and lever rule in each equilibrium diagram.
	3rd	Draw iron-carbon equilibrium diagram and describe different phases and micro-constituents.
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	5th	Discussion on possible questionnaire
8th	1st	Apply lever rule in iron and carbon diagram
	2nd	Apply lever rule in iron and carbon diagram.
	3rd	Differentiate between iron-carbon, iron-cementite and Iron-graphite diagram.
	4th	Discussion on possible questionnaire.
	5th	Define solution, alloying.
9th	1st	Explain different types of solid solution.

	2nd	Explain different types of solid solution.
	3rd	Differentiate between substitutional and interstitial solid solution, chemical compound, mechanical mixture, and intermetallic compound.
	4th	Differentiate between substitutional and interstitial solid solution, chemical compound, mechanical mixture, and intermetallic compound.
	5th	Differentiate between substitutional and interstitial solid solution, chemical compound, mechanical mixture, and Intermetallic compound.
10th	1st	Differentiate between ordered and disordered solid solution.
	2nd	Define Hume-Rothery rule and describe the different Factors governing the formation of solid solution.
	3rd	Discussion on possible questionnaire
	4th	Define Hume-Rothery rule and describe the different factors governing the formation of solid solution.
	5th	Discussion on possible questionnaire
11th	1st	Define cast iron, differentiate between steel and cast iron, alloy steel and alloy cast iron.
	2nd	Define cast iron, differentiate between steel and cast iron, alloy steel and alloy cast iron.
	3rd	Discuss different types of cast iron with their composition.
	4th	Quiz Test.
12th	1st	Discuss different types of cast iron with their composition.
	2nd	Discuss different types of cast iron with their composition.
	3rd	Discuss different types of cast iron with their composition.
	4th	Define graphitizing and role of graphitization in cast Iron.
	5th	Discussion on possible questionnaire
13th	1st	Define graphitisation and role of graphitization in cast Iron.
	2nd	Draw structures of cast iron.
	3rd	Draw structures of cast iron.

	4th	Discussion on possible questionnaire
14th	1st	Discussion on possible questionnaire.
	2nd	Differentiate between metallurgical and biological microscope.
	3rd	Describe different types of metallurgical microscope
	4th	Describe different types of metallurgical microscope.
	5th	State working principle of metallurgical microscope.
5th	1st	Define magnifying power ,resolving power, spherical and chromatic aberration.
	2nd	Discussion on possible questionnaire
	3rd	Explain with sketch principle of electron microscope.
	4th	Prepare a sample for study of microstructures e.g. sampling, cutting, grinding, rough polishing, Intermediate polishing, fine polishing and etching.
	5th	Prepare a sample for study of microstructures e.g. sampling, cutting, grinding, rough polishing, intermediate polishing, fine polishing and etching.

Recommended books: 1.Physical metallurgy by Latkin.

2. Material science and engineering by Raghavan.

Pramod Kumar Sethi

Sr. Lecturer

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