GOVERNMENT POLYTECHNIC JAJPUR

At/ Po: Ragadi, Block: Korei, Dist.: Jajpur, Odisha- 755019
Website: https://www.gpjajpur.org E-mail: principalgpjajpur@yahoo.co.in Contact: 9437135107

DEPARTMENT OF METALLURGICAL ENGINEERING

LESSON PLAN

Discipline Metallurgy	Semester 4th	Name of teaching faculty: Smruti Sangita Sahu P.T.G.F in metallurgy
Subject Physical Metallurgy	**No day/ week class:** 4	**No of week:** 16 **Session:** 2023-2024 (Date:16/01/2024 to 26/04/2024)
Week	Class Day	Topic
1st	1st	Introduction to Physical Metallurgy
	2nd	Define crystal and crystallography
	3rd	Define space lattice and unit cell
	4th	Compare different types of crystal lattices, bravis lattices and primitive lattices.
2nd	1st	Define with sketch Simple Cubic
	2nd	Define with sketch B.C.C
	3rd	Define with sketch F.C.C
	4th	Define with sketch H.C.P
3rd	1st	Define Miller indices, planes and directions
	2nd	Define isotropy and anisotropy in metallic materials
	3rd	Define imperfections in metallic materials
	4th	Differentiate between types of imperfections : point defect
4th	1st	line defect, surface defect and volume defect (elementary idea)
	2nd	discuss on imperfections in solids
	3rd	discuss on sc,bcc,fcc,hcp
	4th	Define alloys and solid solution
5th	1st	Define solidification and crystallization
	2nd	Explain role of free energy thermodynamic potential in conversion of liquid to solid
	3rd	Define super cooling, under cooling, degree of super cooling
	4th	Explain mechanism of solidification/ crystallization, nucleation
6th	1st	critical size nucleus, spontaneous nucleation, relation between ration of nucleation
	2nd	and grain growth.
	3rd	Discuss shape of crystals and solidification of ingot.
	4th	Overall discuss on solidification of pure metal and alloy
7th	1st	Define equilibrium diagram
	2nd	Discuss the importance of equilibrium diagram
	3rd	Draw equilibrium diagram of binary alloys
	4th	State types of equilibrium diagram

8th	1st	Explain isomorphous equilibrium diagram with examples
	2nd	Explain eutectic type and eutectoid equilibrium diagram with example
	3rd	Explain peritectic type and peritectoid equilibrium diagram with example
	4th	Define phase rule, lever rule
9th	1st	Apply phase rule, and lever rule in each equilibrium diagram
	2nd	Draw iron carbon equilibrium diagram
	3rd	Describe different phases and micro constituent in iron carbon diagram
	4th	Discuss role of carbon with iron to differentiate steel and cast iron
10th	1st	Apply lever rule in iron and carbon diagram
	2nd	Differentiate between iron-carbon, iron-cementite, and iron-graphite diagram
	3rd	Overall discuss on phase diagram
	4th	Define solution, alloying
11th	1st	Explain different types of solid solution
	2nd	Differentiate between substitutional and interstitial solid solution
	3rd	Chemical compound, mechanical mixture and intermetallic compounds
	4th	Differentiate between ordered and disordered solid solution
12th	1st	Define Hume Rothery rule and describe the different factors governing the formation of s
	2nd	Overall discuss on solid solution
	3rd	discuss on Hume Rothery Rule
	4th	Define cast iron, differentiate between steel and cast iron
13th	1st	alloy steel and alloy cast iron.
	2nd	Discuss different types of cast iron with their composition
	3rd	Discuss different types of cast iron with their composition
	4th	Define graphitization and role of graphitization in cast iron
14th	1st	Draw structures of cast iron
	2nd	uses of different types of cast iron
	3rd	Overall discuss on Cast iron
	4th	Differentiate between metallurgical microscope & biological microscope
15th	1st	Describe different types of metallurgical microscope
	2nd	State working principle of metallurgical microscope
	3rd	Define magnifying power & resolving power
	4th	Define spherical and chromatic aberration.
16th	1st	Explain with sketch principle of electron microscope
	2nd	Prepare a sample for study of microstructures
	3rd	sampling, cutting, grinding, rough polishing, intermediate polishing, fine polishing and etching
	4th	Overall discuss on microscope

Smruti Sangita Sahu