

## LESSON PLAN

Subject – Materials Engineering and Metallurgy	Branch – Production Engineering
Subject Code – BPE03002	Semester – 3rd

Sl no.	Module	Topic(s)	Period/Hours
1.	I	Introduction to materials- Metal and alloys, ceramics, polymers and semiconducting materials—introduction and application as engineering materials.	1-2
2.	I	Defects in solids- Point, line and surface defects. Diffusion in solids. Deformation of metals- Elastic and plastic deformation, slip, twin, dislocation theory, critical resolved shear stress,	3-6
3.	I	Bauschinger's effect, work hardening, recovery, recrystallization and grain growth.	7
4.	I	Tutorial	8
5.	II	Equilibrium Diagrams: Experimental methods for construction of equilibrium diagrams,	9-11
6.	II	Isomorphous alloy system, Types of Nucleation, determination of the size of critical nucleus,	12-14
7.	II	equilibrium cooling and heating of alloys, lever rule, coring, miscibility gaps – eutectic reactions.	15-18
8.	II	Tutorial	19
9.	III	Transformation in solid state, allotropy, order-disorder transformation,	20-21
10.	III	eutectoid, peritectoid reaction and complex phase diagrams, relation between equilibrium diagrams and physical properties of alloys.	22-24
11.	III	Study of important binary phase diagrams Fe-Fe <sub>3</sub> C. Phase transformations in steels pearlitic, martensitic and bainitic transformations cooling curves.	25-27
12.	III	Isothermal transformation diagrams, transformations on continuous cooling.	28-30
13.	III	Tutorial	31
14.	IV	Heat treatment- Iron-carbon system.	32-34
15.	IV	Annealing, normalizing, hardening, critical cooling rate, hardenability, age hardening, surface hardening, tempering.	35
16.	IV	Tutorial	36
17.	V	High temperature materials, materials for cryogenic application, thermally insulating materials.	37-38
18.	V	Steels: High Speed Steel, Stainless Steel and Tool Steels.	39
19.	V	Tutorial	40