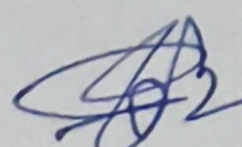
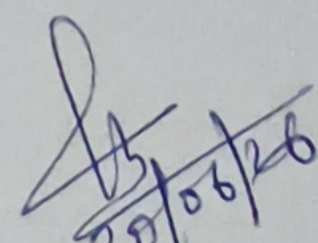


GOVT POLYTECHNIC MAYURBHANJ, TIKARPADA
LESSON PLAN OF ADVANCE MATERIALS ACADEMIC YEAR (2026-2027) WINTER

DISCIPLINE: METALLURGY ENGINEERING		SEMESTER: 5TH	NAME OF THE TEACHING FACULTY: SUBRAT KUMAR BEHERA
SUBJECT: ADVANCE MATERIALS, COURSE CODE: MTPE301		NO OF DAYS/PER WEEK CLASS ALLOTTED:03	SEMESTER FROM DATE:01.07.2026, TO DATE:05.11.2026, NO OF WEEKS: 16
WEEK	CLASS NO	UNITS	LECTURE TOPICS
1	1	CHAPTER -1 INTRODUCTION TO ADVANCED MATERIALS	INTRODUCTION CLASS
	2		Definition and classification of advanced materials.
	3		The driving forces behind advanced materials research and development.
2	4		Comparison between conventional and advanced materials
	5		Applications of advanced materials in various fields (aerospace, automotive, electronics, biomedical, etc.).
	6		DISCUSSION ABOUT ADVANCE MATERIALS
3	7	CHAPTER -2 METALLIC ADVANCED MATERIALS & APPLICATIONS	High-performance alloys (Nickel, Titanium, and Cobalt-based alloys)
	8		Corrosion Resistant Alloys: Stainless Steels (304,316), Magnesium-aluminium alloys (5000 Series (e.g., 5052, 5083), Cobalt-Based Alloy
	9		Superalloys: Types, manufacturing methods (Directionally solidified casting, Single-crystal casting) properties, and applications
4	10		Shape Memory Alloys (SMA) – Nitinol, Cu-Al-Ni alloys
	11		Metallic Glasses (Amorphous Metals): Formation and properties of metallic glasses, Applications of metallic glasses.
	12		DISCUSSION ABOUT SHAPE MEMORY ALLOYS
5	13	CHAPTER -3 POLYMER MATRIX COMPOSITES & CERAMIC MATRIX COMPOSITES	Introduction to Polymers and types: Polymer Matrix Composites (PMCs): Types of reinforcing Fibers (glass, carbon, aramid).
	14		Manufacturing techniques (lay-up). Properties and applications of PMCs.
	15		Introduction to ceramics: Ceramic Matrix Composites (CMCs):
6	16		Reinforcement of ceramic matrices with Fibers or particles.
	17		High-temperature applications of CMCs.
	18		REVISION
7	19		GROUP DISCUSSION
	20		DISCUSSION ABOUT POLYMERS AND CERAMICS
	21		DISCUSSION ABOUT SUPER ALLOYS AND SHAPE MEMORY ALLOYS
8	22		REVISION
	23		SURPRISE TEST

	24		Corrosion Resistant Alloys: Stainless Steels (304,316), Magnesium-aluminium alloys (5000 Series (e.g.,
9	25		Metallic Glasses (Amorphous Metals): Formation and properties of metallic glasses, Applications of metallic glasses.
	26		Manufacturing techniques (lay-up). Properties and applications of PMCs.
	27		High-performance alloys (Nickel, Titanium, and Cobalt-based alloys)
10	28	CHAPTER -4 NANOMATERIALS, SMART MATERIALS & EMERGING TRENDS IN ADVANCED MATERIALS	Nanomaterials: Introduction to Nanomaterials, Classification of nanomaterials (0D, 1D, 2D, 3D).
	29		One Synthesis method each of 0D, 1D, 2D & 3D nanomaterials.
	30		Carbon Nanotubes (CNTs) and Graphene: o Structure, properties, and applications of CNTs and graphene
11	31		Smart Materials: o Definition and classification of smart materials.
	32		Piezoelectric Materials: o Piezoelectric effect and applications.
	33		Energy storage materials (batteries, fuel cells). • Materials for sustainable development.
12	34	REVISION IMPORTANT TOPICS	Nanomaterials: Introduction to Nanomaterials, Classification of nanomaterials (0D, 1D, 2D, 3D).
	35		Smart Materials: o Definition and classification of smart materials.
	36		Piezoelectric Materials: o Piezoelectric effect and applications.
13	37		REVISION
	38		GROUP DISCUSSION
	39		DISCUSSION ABOUT PIEZOELECTRIC MATERIALS
14	40		DISCUSSION ABOUT NANO MATERIALS
	41		Carbon Nanotubes (CNTs) and Graphene: o Structure, properties, and applications of CNTs and graphene
	42		REVISION
15	43		SURPRISE TEST
	44		DISCUSSION ABOUT SUPER MEMORY ALLOYS AND SHAPE MEMORY ALOYS
	45		PRE-SEMESTER
16	46		REVISION
	47		GROUP DISCUSSION
	48		REVISION


 30.6.26
 S. K. Belver
 Unit Stage -11


 30/06/26
 HOD METALLURGICAL ENGG.
 GOVT. POLYTECHNIC MAYURBHANJ
 TIKARPADA