

GOVT POLYTECHNIC MAYURBHANJ, TIKARPADA
LESSON PLAN OF METALLURGICAL THERMODYNAMICS AND KINETICS ACADEMIC YEAR
(2026-2027) WINTER

DISCIPLINE: METALLURGY ENGINEERING		SEMESTER: 3RD	NAME OF THE TEACHING FACULTY: ROHIT KUMAR ROUT
SUBJECT: METALLURGICAL THERMODYNAMICS AND KINETICS, COURSE CODE: MTPC207		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 BASIC CONCEPT OF THERMODYNAMICS	DEFINITION OF THERMODYNAMICS, SYSTEM, SURROUNDINGS, TYPES OF SYSTEMS (OPEN, CLOSED, ISOLATED).
	2		THERMODYNAMIC PROPERTIES (INTENSIVE, EXTENSIVE), STATE FUNCTIONS. ZEROth LAW OF THERMODYNAMICS.
	3		CONCEPT OF THERMAL EQUILIBRIUM, TEMPERATURE MEASUREMENT.
2	4		FIRST LAW OF THERMODYNAMICS: CONSERVATION OF ENERGY, INTERNAL ENERGY, ENTHALPY
	5		HEAT AND WORK, HEAT CAPACITY, SPECIFIC HEAT
	6		APPLICATIONS: BRIEF IDEA ABOUT VARIOUS PROCESSES ISOTHERMAL, ADIABATIC, ISOBARIC, ISOCHORIC.
3	7		REVISION
	8		GROUP DISCUSSION
	9		DOUBT CLEARING CLASS
4	10	CHAPTER -2 SECOND AND THIRD LAW OF THERMODYNAMICS	SURPRISE TEST
	11		ENTROPY: CONCEPT OF ENTROPY, ENTROPY CHANGE IN REVERSIBLE AND IRREVERSIBLE PROCESSES,
	12		ENTROPY AND DISORDER, SECOND LAW STATEMENTS
5	13		DIFFERENT STATEMENTS OF THE SECOND LAW GIBBS FREE ENERGY: DEFINITION OF GIBBS FREE ENERGY, ITS SIGNIFICANCE IN
	14		DETERMINING SPONTANEITY OF REACTIONS, RELATIONSHIP BETWEEN GIBBS FREE ENERGY AND EQUILIBRIUM CONSTANT.
	15		THIRD LAW OF THERMODYNAMICS, GIBBS FREE ENERGY (ΔG) & HELMHOLTZ FREE ENERGY (ΔA), MAXWELL RELATIONS (NO DERIVATION)
6	16		ENTROPY: CONCEPT OF ENTROPY, ENTROPY CHANGE IN REVERSIBLE AND IRREVERSIBLE PROCESSES, GIBBS FREE ENERGY (ΔG) & HELMHOLTZ FREE ENERGY (ΔA), MAXWELL RELATIONS (NO DERIVATION)
	17		REVISION
	18		GROUP DISCUSSION
7	19		DOUBT CLEARING CLASS
	20		SURPRISE TEST
	21		THIRD LAW OF THERMODYNAMICS, GIBBS FREE ENERGY (ΔG) & HELMHOLTZ FREE ENERGY (ΔA), MAXWELL RELATIONS (NO DERIVATION)
8	22		ENTROPY: CONCEPT OF ENTROPY, ENTROPY CHANGE IN REVERSIBLE AND IRREVERSIBLE PROCESSES,
	23		ENTROPY AND DISORDER, SECOND LAW STATEMENTS
	24		MAXWELL RELATIONS (NO DERIVATION)
9	25		REVISION
	26		DOUBT CLEARING CLASS
	27		
10	28	CHAPTER -3	SOLUTIONS & PHASE RULE

11	29	PHASE EQUILIBRIA & METALLURGICAL APPLICATIONS	DEAL & NON- IDEAL SOLUTIONS, RAOULT'S LAW, HENRY'S LAW
	30		PHASE RULE (GIBBS' PHASE RULE), UNARY & BINARY PHASE DIAGRAMS.
	31		ELLINGHAM DIAGRAMS & APPLICATIONS.
	32		CONCEPT OF ELLINGHAM DIAGRAMS, OXIDE STABILITY & REDUCTION REACTIONS, PREDOMINANCE AREA DIAGRAM.
	33		ELLINGHAM DIAGRAMS & APPLICATIONS.
12	34		PHASE RULE (GIBBS' PHASE RULE), UNARY & BINARY PHASE DIAGRAMS.
	35		REVISION
	36		CHEMICAL KINETICS & REACTION RATE THEORY
13	37	CHAPTER -4 CHEMICAL KINETICS & REACTION RATE THEORY	FUNDAMENTALS OF REACTION KINETICS, RATE OF REACTION, ORDER & MOLECULARITY, ACTIVATION ENERGY & ARRHENIUS EQUATION.
	38		HOMOGENEOUS VS HETEROGENEOUS REACTIONS.
	39		ELECTROCHEMICAL THERMODYNAMICS, ELECTROCHEMICAL CELLS, NERNST EQUATION
			REVISION
14	40		FUNDAMENTALS OF REACTION KINETICS, RATE OF REACTION, ORDER & MOLECULARITY, ACTIVATION ENERGY & ARRHENIUS EQUATION
	41		DOUBT CLEARING CLASS
	42		
15	43	CHAPTER -4 THERMODYNAMICS IN METALLURGICAL PROCESSES	APPLICATION OF THERMODYNAMICS IN EXTRACTION & REFINING.
	44		BASICS OF IRONMAKING & STEELMAKING THERMODYNAMICS.
	45		ROASTING, SMELTING, REFINING PROCESSES, BASIC CONCEPT OF ACTIVITY & EQUILIBRIUM CONSTANT.
16	46		REVISION
	47		GROUP DISCUSSION
	48		REVISION


16/7/2026

Head of Department


16/7/2026