

# UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA



## LESSON PLAN

### **SUBJECT-STOICHIOMETRY**

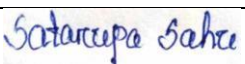
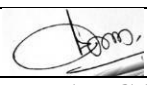
## DEPARTMENT OF CHEMICAL ENGINEERING

	<b>Topics to be covered</b>
WEEK 1	Basic and derived units used in process industry
	Numerical problems on unit conversion from one unit to SI unit
	Dimension and application of dimensional analysis. Different graphs used in industry
	Definition and problems on Mole, mole fraction, mass fraction
WEEK 2	Mole concept with respect to chemical equation and problems solving
	Principle of atom conservation with example
	Methods of expressing composition of mixtures and solutions
	Problem solving on composition of mixtures and solutions
WEEK 3	Definition of stoichiometry, stoichiometry ratio.
	Definition of basis of calculation with examples
	Problems on basis of calculation.
	Concept of limiting reactants with examples
WEEK 4	Problems on limiting reagent
	Definition of Atomic weight, molecular weight and problems solving
	Definition of empirical formula, examples and problems solving
WEEK 5	Concept on chemical reaction on mass-mass basis
	Concept on chemical reaction on mass-volume basis
	Definition of molecular formula, examples and problems solving
WEEK 6	Concept of excess reactants with examples
	Problems on excess reagent
	Problem on chemical reaction on mass-mass basis
	Problem on chemical reaction on mass-volume basis
WEEK 7	Revision and Quiz
	Definition of Ideal gas law, limitations of Ideal gas law STP and NTP conditions
	Problem solving on Ideal gas law

	Derivation of Average molecular weight and problem solving
WEEK 8	Derivation of density for gas mixture and problem solving
	Composition (by weight and volume) of gas mixture and problem solving
	Definition of partial pressure, vapour pressure, Dalton's law and Amagat's law
	Problem solving on partial pressure, vapour pressure
WEEK 9	Problem solving on Dalton's law and Amagat's law
	Definition of Roul't's law and its limitations
	Definition of Henry's law and its limitations
WEEK 10	Problem solving on Roul't's law and Henry's law
	Revision and Quiz test
	State Law of conservation of mass, Concept of material balance
WEEK 11	Material balance, component Balance equations on mixing (Two stream) and problem solving
	Material balance, component Balance equations on mixing (Three stream) and problem solving
	Material balance, component Balance equations on evaporation
WEEK 12	Problem solving based on material balance on evaporation.
	Material balance, component Balance equations on distillation
	Problem solving based on material balance on distillation
WEEK 13	Material balance, component Balance equations on drying and problem solving
	Material balance, component Balance equations on humidification and problem solving
	Material balance, component Balance equations on extraction.
	Problem solving based on material balance on extraction
WEEK 14	Material balance, component Balance equations on absorption
	Problem solving based on material balance on absorption
	Material balance, component Balance equations on crystallizer cum evaporator and problem
WEEK 15	Material balance, component Balance equations on oil seed extraction and problem solving
	Law of conservation of mass
	Definition of Stoichiometric ratio, Stoichiometric proportions, excess reactants, percentage excess, conversion, yield, selectivity and their formulas
	Problem solving on excess reagents and percentage excess.
WEEK 16	Problems solving on yield and selectivity.
	Concept and reaction mechanism in combustion
	Solve problems on material balance with chemical reaction and combustion Concept of recycle and by pass
WEEK 17	Definition of terms of Combustion
	Problem solving on combustion
	Excess air, Problems related to combustion
	Revision

#### BOOKS FOR REFERENCE:

- Chemical process principle by Hougen and Watson, CBS Publication
- Introduction to Process Calculation by K A Gavane, Nirali Prakasan.

	<b>Prepared by</b>	<b>Approved by</b>
<b>Signature</b>		
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<b>SESSION</b>	<b>2023-24</b>	