

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR



DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN

SUBJECT	INTRODUCTION TO CHEMICAL ENGINEERING
SUBJECT CODE	CHEPC201 (TH:1)
SEMESTER	3rd
ACADEMIC SESSION	2026 - 2027 (01.07.2026 to 05.11.2026)
NAME OF FACULTY	Sri PRATEEK DAS, LECTURER (Stage-II), CHEMICAL ENGG.

WEEK	CLASS	TOPICS COVERED	TEACHING METHOD
WEEK 1	1	Course overview; Definition of Chemical Engineering and Chemical Industry	Lecture + Discussion
	2	Role of Physics, Chemistry, Biology, Biochemistry, Mathematics and Economics in Chemical Engineering	Lecture + Discussion
	3	Duties and Responsibilities of Chemical Engineer	Lecture + Discussion
WEEK 2	4	Difference between Chemical Engineering and Chemistry	Comparative Study + Discussion
	5	Unit-I revision	Tutorial + Discussion
	6	Class Test – Unit-I	Written Test + Evaluation
WEEK 3	7	Unit Operations – definition and brief description	Lecture + Discussion
	8	Unit Processes – definition and brief description	Lecture + Discussion
	9	Batch and Continuous Process	Comparative Study + Discussion
WEEK 4	10	Block Diagram and Flowsheet – concepts and examples	Lecture + Diagram-based Explanation
	11	PFD and P&ID – concepts and examples	Lecture + Diagram-based Explanation
	12	Role of Process Control Engineering in Chemical Plants	Lecture + Discussion
WEEK 5	13	DCS, PLC and SCADA – commonly used control systems	Lecture + Discussion
	14	Model, Prototype and Pilot Plant – concepts and use cases	Lecture + Discussion

	15	Engineering, Procurement and Construction (EPC) Contract – concept	Lecture + Discussion
WEEK 6	16	Unit-II revision	Tutorial + Discussion
	17	Class Test – Unit-II	Written Test + Evaluation
	18	Role of Chemical Engineers in Food and Pharmaceutical Industries	Lecture + Case Study
WEEK 7	19	Role of Chemical Engineers in Energy and Environmental Industries	Lecture + Case Study
	20	Role of Chemical Engineers in Biochemical and Electronics Industries	Lecture + Discussion
	21	Importance of Quality Check and Quality Control in Chemical and Allied Industries	Lecture + Discussion
WEEK 8	22	Simulation and Modelling – definition, importance and applications	Lecture + Discussion
	23	Process simulation software: ASPEN, ANSYS, HYSYS, CHEMCAD, PRO/II and DWSIM	Demonstration + Discussion
	24	Role of IoT and AI in Chemical Engineering	Lecture + Case Study
WEEK 9	25	Unit-III revision	Tutorial + Discussion
	26	Class Test – Unit-III	Written Test + Evaluation
	27	Traditional vs Modern Chemical Engineering	Comparative Study + Discussion
WEEK 10	28	Opportunities for a Chemical Engineer	Lecture + Discussion
	29	Scope and Future of Chemical Engineering	Lecture + Discussion
	30	Unit-IV revision	Tutorial + Discussion
WEEK 11	31	Class Test – Unit-IV	Written Test + Evaluation
	32	Greatest Achievements in Chemical Engineering	Lecture + Discussion
	33	Role of Professional Bodies/Societies: AIChE, ACS, IChE, etc.	Lecture + Discussion
WEEK 12	34	Chemical Engineering Industries in India	Lecture + Discussion
	35	Chemical Engineering Industries in Odisha	Lecture + Case Study
	36	Raw Materials, Products and End Uses of Chemical Industries in Odisha	Case Study + Discussion
WEEK 13	37	Unit-V revision	Tutorial + Discussion
	38	Class Test – Unit-V	Written Test + Evaluation
	39	Comprehensive revision – Units I & II	Tutorial + Discussion
WEEK 14	40	Comprehensive revision – Units III & IV	Tutorial + Discussion
	41	Comprehensive revision – Unit V	Tutorial + Discussion
	42	Model Paper Discussion and Doubt Clearing	Discussion + Tutorial
WEEK 15	43	Model Test	Written Test
	44	Test Analysis and Feedback	Discussion + Evaluation
	45	Course Recap and Wrap-up	Revision + Discussion

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR



DEPARTMENT OF CHEMICAL ENGINEERING LESSON PLAN

SUBJECT	INDUSTRIAL CHEMISTRY
SUBJECT CODE	CHEPC203 (TH:2)
SEMESTER	3rd
SESSION	2026 - 2027 (01.07.2026 to 05.11.2026)
NAME OF FACULTY	Sri SIBASISH MAHAPATRA, GUEST FACULTY, CHEMICAL ENGG.

WEEK	CLASS	TOPICS COVERED	TEACHING METHOD
WEEK 1	1	Introduction to Organic Chemistry; classification of organic compounds; importance of organic chemistry in chemical industries	Lecture + Discussion
	2	Classification of organic compounds based on structure and functional groups	Lecture + Board Work
	3	Homologous series; general characteristics and nomenclature of organic compounds	Lecture + Tutorial
WEEK 2	4	Isomerism: concept and classification; structural isomerism	Lecture + Discussion
	5	Functional groups and their identification in organic compounds	Lecture + Demonstration
	6	Basic types of organic reactions: substitution, addition, elimination and oxidation	Lecture + Board Work
WEEK 3	7	Introduction to aliphatic compounds; classification of aliphatic hydrocarbons	Lecture + Discussion
	8	Methane: methods of preparation, physical properties and chemical reactions	Lecture + Board Work
	9	Industrial applications and importance of methane	Lecture + Discussion
WEEK 4	10	Ethane: methods of preparation, physical properties and chemical reactions	Lecture + Board Work
	11	Industrial applications and importance of ethane	Lecture + Discussion
	12	Ethylene/Ethene: methods of preparation, physical properties and chemical reactions	Lecture + Board Work
WEEK 5	13	Industrial preparation and applications of ethylene/ethene	Lecture + Discussion
	14	Methanol: preparation methods, physical properties and chemical reactions	Lecture + Board Work
	15	Industrial applications and uses of methanol	Lecture + Discussion
WEEK 6	16	Ethanol: methods of preparation and physical properties	Lecture + Board Work
	17	Chemical reactions and chemical properties of ethanol	Lecture + Demonstration
	18	Industrial applications and uses of ethanol; comparison of methanol and ethanol	Discussion + Tutorial
WEEK 7	19	Acetic acid: methods of preparation and physical properties	Lecture + Board Work
	20	Chemical reactions and chemical properties of acetic acid	Lecture + Demonstration

	21	Industrial applications and uses of acetic acid	Lecture + Discussion
WEEK 8	22	Formaldehyde: methods of preparation and physical properties	Lecture + Board Work
	23	Chemical reactions and chemical properties of formaldehyde	Lecture + Demonstration
	24	Industrial applications and uses of formaldehyde; revision of aliphatic compounds	Discussion + Revision
WEEK 9	25	Acetone: methods of preparation, physical properties and chemical reactions	Lecture + Board Work
	26	Industrial applications and uses of acetone	Lecture + Discussion
	27	REVISION – Important preparations, properties, reactions and industrial applications	Revision + Q & A
WEEK 10	28	Introduction to aromatic compounds; structure and characteristics of benzene	Lecture + Discussion
	29	Benzene: preparation methods, physical properties and chemical reactions	Lecture + Board Work
	30	Industrial importance and applications of benzene and important aromatic compounds	Lecture + Discussion
WEEK 11	31	Introduction to colloids: definition, classification and characteristics of colloidal systems	Lecture + Discussion
	32	Preparation and purification of colloids; properties of colloidal solutions	Lecture + Demonstration
	33	Emulsions: definition, types, preparation, properties and applications	Lecture + Demonstration
WEEK 12	34	Gels: definition, classification, preparation, properties and applications	Lecture + Discussion
	35	Industrial applications of colloids, emulsions and gels	Lecture+Industrial Examples
	36	REVISION – Aromatic compounds, colloids, emulsions and gels	Revision + Q & A
WEEK 13	37	Introduction to polymers; definition, classification and terminology	Lecture + Discussion
	38	Addition polymerization and condensation polymerization	Lecture + Board Work
	39	Factors affecting polymerization; degree of polymerization and molecular weight	Lecture + Tutorial
WEEK 14	40	Thermoplastics and thermosetting polymers; differences and applications	Lecture + Discussion
	41	Important industrial polymers: polyethylene, PVC, polystyrene and related polymers	Lecture+Industrial Examples
	42	Industrial applications and uses of polymers; environmental aspects of polymeric materials	Discussion + Case Study
WEEK 15	43	Important synthetic polymers and their properties, preparation and applications – revision	Revision + Discussion
	44	REVISION – Complete syllabus revision	Comprehensive Revision + Question Answer
	45	FINAL REVISION/ MODEL TEST – Important definitions, reactions, preparation methods, properties, applications and short-answer questions	Model Test + Evaluation

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DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN

SUBJECT	CHEMICAL PROCESS CALCULATION
SUBJECT CODE	CHEPC205 (TH:3)
SEMESTER	3rd
SESSION	2026 - 2027 (01.07.2026 to 05.11.2026)
NAME OF FACULTY	Smt. SATARUPA SAHU, LECTURER (Stage-I), CHEMICAL ENGG.

WEEK	CLASS	TOPICS COVERED	TEACHING METHOD
WEEK1	1	Dimensions and systems of units	Lecture + Discussion
	2	Fundamental quantities of units, Derived quantities	Lecture + Discussion
	3	Unit conversions in MKS and SI systems	Lecture + Demonstration
WEEK2	4	Solve numerical on unit conversion	Tutorial + Written Practice
	5	Importance of basis of calculation	Lecture + Discussion
	6	Concept of mole, atom, atomic weight, molecular weight	Lecture + Discussion
WEEK3	7	Solve numerical on kmole, katom, molecular weight	Tutorial + Written Practice
	8	Solve numerical on equivalent weight	Tutorial + Written Practice
	9	Composition of solid, liquid and gas in terms of mass, mole and volume by expressing in percentage	Lecture + Discussion
WEEK4	10	Composition of solid, liquid and gas in terms of mass, mole and volume by ratio and fraction	Lecture + Discussion
	11	Solve numerical on composition of mixture	Tutorial + Written Practice
	12	Formula and definition of Molarity, Molality, Normality	Lecture + Discussion
WEEK5	13	Solve simple numerical on molarity	Tutorial + Written Practice
	14	Solve simple numerical on normality	Tutorial + Written Practice
	15	Solve numerical on molarity	Tutorial + Written Practice
WEEK6	16	Concept of Partial pressure and Vapour pressure; Different Gas Laws: Boyle's Law, Charle's Law, Avogadro's Law,	Lecture + Diagram
	17	Solve numerical problem on Boyle's Law, Charle's Law, Avogadro's Law	Tutorial + Written Practice
	18	Solve numerical problem on Boyle's Law, Charle's Law, Avogadro's Law	Tutorial + Written Practice
WEEK7	19	Gay Lussac's Law, Amagat's Law, Dalton's	Lecture + Discussion

		Law, Ideal Gas Law;	
	20	Solve numerical problem on Gay Lussac's Law, Amagat's Law, Dalton's Law, Ideal Gas Law;	Tutorial + Written Practice
	21	Solve numerical problem on Gay Lussac's Law, Amagat's Law, Dalton's Law, Ideal Gas Law;	Tutorial + Written Practice
WEEK8	22	Difference between Ideal solution and Real solution; Raoult's Law and Henry's Law	Lecture + Discussion
	23	Solve numerical on gas laws and solutions	Tutorial + Written Practice
	24	Solve numerical	Tutorial + Written Practice
WEEK9	25	REVISION	Written Test + Revision
	26	Law of conservation of mass; Material balance equation for unit operations	Lecture + Discussion
	27	Principles, Block diagram, problem on distillation,	Lecture + Diagram
WEEK10	28	Solve numerical on distillation	Tutorial + Written Practice
	29	Principles, Block diagram and problem based on evaporation,	Lecture + Diagram
	30	Solve numerical on evaporation	Tutorial + Written Practice
WEEK 11	31	Principles, Block diagram and problem based on drying,	Lecture + Diagram
	32	Solve numerical on drying	Tutorial + Written Practice
	33	Principles, Block diagram and problem based on mixing	Lecture + Diagram
WEEK12	34	Solve numerical on mixing	Tutorial + Written Practice
	35	REVISION	Written Test + Revision
	36	Concept of Excess and Limiting reactant, Conversion, Yield and Selectivity	Lecture + Discussion
WEEK13	37	solve simple numerical on excess limiting agent	Tutorial + Written Practice
	38	Solve numerical on conversion yield	Tutorial + Written Practice
	39	Solve numerical on conversion and selectivity	Tutorial + Written Practice
WEEK14	40	Revision	Written Test + Revision
	41	Standard Heat of Reaction; Standard Heat of Combustion; Standard Heat of Formation	Lecture + Discussion
	42	Hess Law of Constant Heat Summation	Lecture + Discussion
WEEK15	43	Solve numerical on Standard Heat of Reaction	Tutorial + Written Practice
	44	Solve numerical on Law of Constant Heat Summation	Tutorial + Written Practice
	45	REVISION	Written Test + Revision

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DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN

SUBJECT	MOMENTUM TRANSFER
SUBJECTCODE	CHEPC207 (TH:4)
SEMESTER	3rd
SESSION	2026 - 2027 (01.07.2026 to 05.11.2026)
NAME OF FACULTY	Sri PRATEEK DAS, LECTURER (Stage-II), CHEMICAL ENGG.

WEEK	CLASS	TOPICS	TEACHING METHOD
WEEK 1	1	Course overview; Difference between solids and fluids	Lecture + Discussion
	2	Fluid properties: Mass density, Weight density, Specific volume, Specific gravity	Lecture + Examples
	3	Surface tension and Viscosity: Dynamic and Kinematic	Lecture + Discussion
WEEK 2	4	Newton's Law of Viscosity	Lecture + Derivation
	5	Simple numerical problems on viscosity	Tutorial + Problem Solving
	6	Types of Fluid: Ideal and Real Fluid; Newtonian and Non-Newtonian Fluid	Lecture+ Comparative Study
WEEK 3	7	Fluid pressure and Pascal's Law	Lecture + Diagram-based Explanation
	8	Hydrostatic Equilibrium	Lecture + Derivation
	9	Manometers: Piezometer, U-Tube and Differential Manometer	Lecture+Diagram-based Explanation
WEEK 4	10	Barometer; Concept of Buoyancy	Lecture + Diagram-based Explanation
	11	Archimedes' Principle	Lecture + Discussion
	12	Unit-I revision and problem solving	Tutorial + Problem Solving
WEEK 5	13	Class Test – Unit-I	Written Test + Evaluation
	14	Types of Fluid Flow: Steady and Unsteady; Uniform and Non-Uniform	Lecture+ Comparative Study
	15	Compressible and Incompressible; Rotational and Irrotational Flow	Lecture+ Comparative Study
WEEK 6	16	Equation of Continuity; Mass Flow Rate and Volumetric Flow Rate	Lecture + Derivation

	17	Simple numerical problems on Continuity Equation and Flow Rate	Tutorial + Problem Solving
	18	Reynolds Experiment and its significance	Lecture + Demonstration
WEEK 7	19	Laminar, Transition and Turbulent Flow; Critical Velocity	Lecture + Discussion
	20	Bernoulli's Theorem and practical applications	Lecture + Derivation
	21	Bernoulli's Equation for ideal and real fluid	Lecture + Derivation
WEEK 8	22	Simple numerical problems on Bernoulli's Equation	Tutorial + Problem Solving
	23	Pressure drop and frictional losses in pipes; Skin and Form Friction	Lecture + Discussion
	24	Effect of Roughness; Friction Factor and Fanning Equation	Lecture + Problem Solving
WEEK 9	25	Hagen-Poiseuille Equation; Simple numerical problems	Lecture + Problem Solving
	26	Venturimeter: Principle, Construction, Working and Coefficient	Lecture + Diagram-based Explanation
	27	Venturimeter: Formula for flow-rate measurement; Simple numericals	Tutorial + Problem Solving
WEEK 10	28	Orificemeter: Principle, Construction, Working and Coefficient	Lecture + Diagram-based Explanation
	29	Orificemeter: Formula for flow-rate measurement; Simple numericals	Tutorial + Problem Solving
	30	Pitot Tube and Rotameter: Working principle and diagram	Lecture + Diagram-based Explanation
WEEK 11	31	Simple numerical problems on flow-rate measurement	Tutorial + Problem Solving
	32	Unit-II revision	Tutorial + Discussion
	33	Class Test – Unit-II	Written Test + Evaluation
WEEK 12	34	Difference between pipe and tube; Standard sizes of pipes	Lecture+ Comparative Study
	35	Wall Thickness, Schedule Number, Nominal Diameter and BWG Number	Lecture + Examples
	36	Types of joints and fittings	Lecture + Diagram-based Explanation
WEEK 13	37	Valves and applications: Gate, Globe, Ball and Needle Valves	Lecture + Diagram-based Explanation
	38	Non-return, Butterfly, Diaphragm and Pressure Relief Valves	Lecture + Comparative Study
	39	Class Test – Unit-III	Written Test + Evaluation
WEEK 14	40	Classification of Pumps; Centrifugal Pump: Definition, Construction and Working	Lecture + Diagram-based Explanation
	41	Centrifugal Pump: Advantages, Disadvantages and Characteristic Curves	Lecture + Discussion
	42	Priming, NPSH and Cavitation	Lecture + Diagram-based Explanation
WEEK 15	43	Losses in Centrifugal Pump; Applications of Reciprocating, Piston, Plunger, Diaphragm and Gear Pumps	Lecture + Comparative Study
	44	Fluidisation: Condition, Types and Applications	Lecture + Discussion
	45	Class Test – Unit-IV & Unit-V	Written Test + Evaluation

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DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN

SUBJECT	MECHANICAL OPERATIONS
SUBJECTCODE	CHEPC209 (TH:5)
SEMESTER	3rd
SESSION	2026 - 2027 (01.07.2026 to 05.11.2026)
NAMEOF FACULTY	Sri SATYA SANKAR RAJ, PRINCIPAL, UCPEs, BERHAMPUR

WEEK	CLASS	TOPICS COVERED	TEACHING METHOD
WEEK 1	1	Size Reduction of Solids: importance in Chemical Engineering and its application in Chemical industry	Lecture & discussion
	2	Objectives of size reduction; Size reducing methods: Impact, Compression, Attrition and Shear	Lecture with examples
	3	Laws of Comminution: Kick's Law, Rittinger's Law and Bond's Law	Lecture & derivation
WEEK 2	4	Power consumption in crushing, Solve simple problems	Lecture & problem solving
	5	Solve simple problems on Kick's Law, Rittinger's Law and Bond's Law	Tutorial
	6	Coarse Crushers: Operating principle, Kick's Law, Rittinger's Law and Bond's Law	Lecture & discussion
WEEK 3	7	Construction, working, diagram and applications of Jaw Crusher, Gyratory Crusher	Diagram-based explanation
	8	Construction, working, diagram and applications of Crushing Roll	Diagram-based explanation
	9	Intermediate and fine grinders: Operating principle, construction, working, diagram and applications of Hammer Mill	Diagram-based explanation
WEEK 4	10	Ball Mill; Applications of Ball mill	Lecture & diagram-based explanation
	11	Critical speed of Ball mill	Lecture & derivation
	12	Numerical on Ball mill and roll crushers	Tutorial & problem solving

WEEK 5	13	Ultrafine grinders	Lecture & discussion
	14	Free and choke grinding	Lecture with examples
	15	Closed and Open circuit grinding; Dry and wet grinding	Comparative study & discussion
WEEK 6	16	Characterization of solid particles: Sphericity, Sauter7mean diameter,	Lecture & derivation
	17	Mass mean diameter, volume mean diameter	Lecture & problem solving
	18	Screening: Definition, Comparison between Ideal screen and actual screen	Lecture & comparative study
WEEK 7	19	Screen Analysis- Types & Procedure & Calculation	Lecture & problem solving
	20	Numerical on Screen analysis	Tutorial
	21	Graphical presentation of Screen analysis	Board work & problem solving
WEEK 8	22	Types of standard screen sizes	Lecture with examples
	23	Factors affecting screening operation	Discussion
	24	Capacity and effectiveness of screen	Lecture & problem solving
WEEK 9	25	Screening equipment	Lecture & discussion
	26	Operating principles & application of Grizzlies, Trommels, Vibrating and Gyratory screens	Comparative study & diagram-based explanation
	27	Operating principle, diagram and applications of Classifier, Jig	Diagram-based explanation
WEEK 10	28	Operating principles & application of Electrostatic Precipitator	Lecture & diagram-based explanation
	29	Operating principles & application of Froth Floatation Cell	Lecture & diagram-based explanation
	30	Operating principles & application of Magnetic separator, Cyclone Separator	Comparative study & diagram-based explanation
WEEK 11	31	Operating principles & application of Scrubber, Clarifier	Lecture & diagram-based explanation
	32	Operating principles & application of Thickener	Lecture & diagram-based explanation
	33	Filtration-Objective, Principle and Type	Lecture & discussion
WEEK 12	34	Filtration equipment-construction and operation	Diagram-based explanation
	35	Constant rate and Constant pressure filtration	Lecture & derivation
	36	Difference between mixing and agitation	Comparative study & discussion
WEEK 13	37	Operating principles & application of Agitated vessel	Lecture & diagram-based explanation
	38	Operating principles & application Impeller, Propeller, Paddle and Turbine blade	Comparative study & diagram-based explanation
	39	Concept of swirling and vortex	Lecture & discussion
WEEK 14	40	Function of baffles; Power consumption in a stirred vessel	Lecture & problem solving
	41	Objective of transportation and storage of solids	Lecture & discussion
	42	Transportation of solids (Diagram, Working and	Diagram-based

		application) by Belt Conveyor, Screw Conveyor	explanation & comparative study
WEEK 15	43	Operating principles & application of Bucket Elevator, Scraper	Diagram-based explanation & discussion
	44	Operating principles & application of Pneumatic Conveyor	Lecture & diagram-based explanation
	45	Storage: Hopper, Bin and Silo; Angle of Repose	Lecture & diagram-based explanation
WEEK 16	46	Revision and doubt clear	Tutorial & doubt clarification
	47	Revision and doubt clear	Tutorial & doubt clarification

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DEPARTMENT OF CHEMICAL ENGINEERING LESSON PLAN

SUBJECT	INDUSTRIAL CHEMISTRY LAB
SUBJECT CODE	CHEPC211 (PR:1)
SEMESTER	3rd
SESSION	2026 - 2027 (01.07.2026 to 05.11.2026)
NAME OF FACULTY	Sri SIBASISH MAHAPATRA, GUEST FACULTY, CHEMICAL ENGG.

WEEK	CLASS	TOPICS COVERED	Teaching Method
WEEK 1	1	Introduction to Organic Chemistry Laboratory; laboratory safety rules, personal protective equipment and handling of chemicals	Lecture + Demonstration
	2	Introduction to qualitative analysis of organic compounds; preliminary examination of organic compounds	Lecture + Demonstration
	3	Detection of nitrogen in organic compounds – principle and preparation of sodium fusion/Lassaigne's extract	Demonstration+Discussion
	4	Detection of nitrogen – practical experiment, observation and identification of nitrogen	Practical + Viva
WEEK 2	5	Detection of sulphur in organic compounds – principle, reactions and preparation of test solution	Lecture + Demonstration
	6	Detection of sulphur – practical experiment and observation	Practical + Discussion
	7	Detection of halogen in organic compounds – principle and test for chlorine, bromine and iodine	Lecture + Demonstration
	8	Detection of halogen – practical experiment, observation and identification	Practical + Viva
WEEK 3	9	Experiment 1 Revision: Detection of nitrogen, sulphur and halogen; precautions and interpretation of observations	Revision + Discussion
	10	Complete practical exercise on detection of elements in organic compounds	Practical
	11	Recording observations, chemical equations and preparation of laboratory record	Practical + Record Work
	12	Viva-voce and assessment on detection of elements	Viva + Evaluation
WEEK 4	13	Introduction to functional group analysis; principle and identification scheme	Lecture + Demonstration
	14	Detection of carboxylic group – principle, test reactions and observations	Demonstration+Discussion
	15	Detection of carboxylic group – practical experiment	Practical
	16	Recording observations, reactions and viva on carboxylic group	Practical + Viva
WEEK 5	17	Detection of phenolic group – principle and characteristic test reactions	Lecture + Demonstration
	18	Detection of phenolic group – practical experiment and observation	Practical
	19	Detection of alcoholic group – principle and characteristic test	Lecture + Demonstration

		reactions	
	20	Detection of alcoholic group – practical experiment and observation	Practical + Viva
WEEK 6	21	Experiment 2 Revision: Identification of carboxylic, phenolic and alcoholic groups	Revision + Discussion
	22	Comparative identification of functional groups using characteristic reactions	Demonstration+Discussion
	23	Practical identification of unknown organic compounds based on functional groups	Practical+Problem Solving
	24	Viva-voce, observation recording and evaluation of functional group analysis	Viva + Evaluation
WEEK 7	25	Introduction to organic compound preparation; laboratory safety, reaction conditions and purification	Lecture + Demonstration
	26	Laboratory preparation of oxalic acid – principle, reaction and procedure	Lecture + Demonstration
	27	Laboratory preparation of oxalic acid – practical execution	Practical
	28	Purification, crystallization, observation and recording of oxalic acid preparation	Practical + Record Work
WEEK 8	29	Laboratory preparation of benzoic acid – principle, reaction and procedure	Lecture + Demonstration
	30	Laboratory preparation of benzoic acid – practical execution	Practical
	31	Purification and crystallization of benzoic acid; observation and result	Practical + Discussion
	32	Viva-voce and evaluation on preparation of oxalic acid and benzoic acid	Viva + Evaluation
WEEK 9	33	Laboratory preparation of Methyl Orange – principle, diazotization and coupling reaction	Lecture + Demonstration
	34	Preparation of Methyl Orange – practical execution	Practical
	35	Purification, filtration and observation of prepared Methyl Orange	Practical + Discussion
	36	Experiment 3 Revision: Oxalic acid, benzoic acid and Methyl Orange preparations	Revision + Viva
WEEK 10	37	Introduction to synthetic resins; concept, classification and industrial applications of resins	Lecture + Discussion
	38	Laboratory preparation of Urea Formaldehyde Resin – principle, raw materials and reaction	Lecture + Demonstration
	39	Urea Formaldehyde Resin – laboratory preparation and practical execution	Practical
	40	Observation, properties and applications of Urea Formaldehyde Resin; record work	Practical + Discussion
WEEK 11	41	Experiment 4 Revision: Urea Formaldehyde Resin – principle, procedure, reactions and precautions	Revision + Discussion
	42	Repetition of Urea Formaldehyde Resin preparation by students	Practical
	43	Observation, identification of resin properties and industrial applications	Practical + Discussion
	44	Viva-voce and evaluation of Urea Formaldehyde Resin preparation	Viva + Evaluation
WEEK 12	45	Laboratory preparation of Bakelite (Phenol Formaldehyde Resin) – introduction and principle	Lecture + Demonstration
	46	Bakelite preparation – reaction, raw materials and operating procedure	Lecture + Demonstration
	47	Laboratory preparation of Bakelite – practical execution	Practical
	48	Observation, properties and applications of Bakelite; record work	Practical + Discussion
WEEK 13	49	Experiment 5 Revision: Bakelite preparation, reaction mechanism, precautions	Revision + Discussion

	50	Repetition of Bakelite preparation by students	Practical
	51	Observation and comparison of thermosetting resin properties	Practical + Discussion
	52	Viva-voce and evaluation on Bakelite preparation	Viva + Evaluation
WEEK 14	53	Laboratory preparation of Nylon 6-6: introduction, principle and polymerization concept	Lecture + Demonstration
	54	Nylon 6-6 preparation – reactants, reaction and laboratory procedure	Lecture + Demonstration
	55	Laboratory preparation of Nylon 6-6 – practical execution	Practical
	56	Observation, properties and industrial applications of Nylon 6-6	Practical + Discussion
WEEK 15	57	Experiment 6 Revision: Nylon 6-6 preparation, reaction, precautions and applications	Revision + Discussion
	58	Repetition of Nylon 6-6 preparation and practical assessment	Practical + Evaluation
	59	COMPREHENSIVE REVISION: All experiments, principles, procedures, observations, reactions and precautions	Comprehensive Revision + Viva
	60	FINAL PRACTICAL / MODEL VIVA: Experimental performance, laboratory record evaluation and viva-voce	Sessional Test + Viva + Evaluation

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DEPARTMENT OF CHEMICAL ENGINEERING LESSON PLAN

SUBJECT	MOMENTUM TRANSFER
SUBJECT CODE	CHEPC213 (PR:2)
SEMESTER	3rd
SESSION	2026 - 2027 (01.07.2026 to 05.11.2026)
NAME OF FACULTY	Sri PRATEEK DAS, LECTURER (Stage-II), CHEMICAL ENGG.

WEEK	CLASS	TOPICS COVERED	TEACHING METHOD
WEEK 1	1	Introduction to Momentum Transfer Laboratory; laboratory safety rules, precautions and general operating procedures	Lecture + Demonstration
	2	Experiment 1: Demonstration of operation of different types of manometers – principle and types	Lecture + Demonstration
	3	Manometers – construction, working and pressure measurement	Demonstration+Discussion
	4	Experiment 1: Practical demonstration, observation and recording	Practical + Viva
WEEK 2	5	Experiment 2: Demonstration of Reynolds apparatus – principle and experimental setup	Lecture + Demonstration
	6	Reynolds experiment – procedure and identification of flow regimes	Demonstration+Discussion
	7	Reynolds experiment – practical observation and determination of flow regime	Practical
	8	Recording observations, calculations and viva on Reynolds experiment	Practical + Viva
WEEK 3	9	Experiment 3: Verification of Bernoulli's equation – principle and theoretical background	Lecture + Demonstration
	10	Bernoulli's equation – experimental setup, procedure and observations	Demonstration+Discussion
	11	Verification of Bernoulli's equation – practical experiment	Practical
	12	Calculations, comparison of theoretical and experimental results and record work	Practical + Discussion
WEEK 4	13	Experiment 3: Viva and evaluation; sources of experimental error and precautions	Viva + Evaluation
	14	Experiment 4: Demonstration of operation of Venturimeter – principle and construction	Lecture + Demonstration
	15	Venturimeter – working, flow measurement and coefficient of discharge	Demonstration+Discussion
	16	Venturimeter – practical demonstration and observation	Practical + Viva
WEEK 5	17	Experiment 5: Demonstration of operation of Orificemeter – principle and construction	Lecture + Demonstration

	18	Orificemeter – working, flow measurement and coefficient of discharge	Demonstration+Discussion
	19	Orificemeter – practical demonstration and observation	Practical
	20	Calculations, record work and viva on Orificemeter	Practical + Viva
WEEK 6	21	Experiment 6: Losses in pipe flow – introduction and types of losses	Lecture + Discussion
	22	Major and minor losses; experimental setup and procedure	Lecture + Demonstration
	23	Determination of losses in pipe flow – practical experiment	Practical
	24	Calculations, observations and preparation of laboratory record	Practical + Record Work
WEEK 7	25	Experiment 6: Analysis of experimental results and comparison of pipe-flow losses	Practical + Discussion
	26	Experiment 7: Demonstration of operation of Centrifugal Pump – principle and construction	Lecture + Demonstration
	27	Centrifugal pump – working, priming and operating procedure	Demonstration+Discussion
	28	Centrifugal pump – practical demonstration and observation	Practical
WEEK 8	29	Centrifugal pump – discharge measurement and performance observation	Practical
	30	Centrifugal pump – head, power and efficiency calculations	Practical+Problem Solving
	31	Centrifugal pump – precautions, troubleshooting and record work	Practical + Discussion
	32	Viva-voce and evaluation of Centrifugal Pump experiment	Viva + Evaluation
WEEK 9	33	Experiment 8: Flow Through Fluidized Bed – principle and concept of fluidization	Lecture + Demonstration
	34	Fluidized bed – experimental setup, working and procedure	Demonstration+Discussion
	35	Flow through fluidized bed – practical experiment	Practical
	36	Observation, calculations and preparation of laboratory record	Practical + Record Work
WEEK 10	37	Flow through fluidized bed – analysis of pressure drop and experimental results	Practical + Discussion
	38	Experiment 8: Viva, precautions and evaluation	Viva + Evaluation
	39	Experiment 9: Basic Plumbing Practice – introduction to plumbing tools and materials	Lecture + Demonstration
	40	Plumbing joints, fittings, pipes and valves – identification and applications	Demonstration+Discussion
WEEK 11	41	Basic plumbing practice – measurement, cutting and joining of pipes	Practical
	42	Basic plumbing practice – assembly of pipe fittings and joints	Practical
	43	Basic plumbing practice – practical execution and leak testing	Practical
	44	Observation, troubleshooting and record work	Practical + Discussion
WEEK 12	45	Experiment 9: Viva-voce and evaluation of Basic Plumbing Practice	Viva + Evaluation
	46	Revision of Experiments 1–3: Manometers, Reynolds apparatus and Bernoulli's equation	Revision + Discussion
	47	Practical repetition of Experiments 1–3	Practical + Evaluation
	48	Viva and record evaluation of Experiments 1–3	Viva + Evaluation

WEEK 13	49	Revision of Experiments 4–6: Venturimeter, Orificemeter and pipe-flow losses	Revision + Discussion
	50	Practical repetition of Experiments 4–6	Practical
	51	Numerical calculations and interpretation of experimental results	Problem Solving
	52	Viva and record evaluation of Experiments 4–6	Viva + Evaluation
WEEK 14	53	Revision of Experiments 7–9: Centrifugal pump, fluidized bed and plumbing practice	Revision + Discussion
	54	Practical repetition of Experiments 7–9	Practical
	55	Troubleshooting, precautions and interpretation of experimental results	Practical + Discussion
	56	Viva and record evaluation of Experiments 7–9	Viva + Evaluation
WEEK 15	57	Comprehensive revision of all experiments – principles and procedures	Comprehensive Revision
	58	Comprehensive practical assessment	Practical + Evaluation
	59	Laboratory record verification and doubt clearing	Record Work + Discussion
	60	Final practical examination and viva-voce	Practical+Viva+Evaluation

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR



DEPARTMENT OF CHEMICAL ENGINEERING LESSON PLAN

SUBJECT	MECHANICAL OPERATIONS
SUBJECT CODE	CHEPC215 (PR:4)
SEMESTER	3rd
SESSION	2026 - 2027 (01.07.2026 to 05.11.2026)
NAME OF FACULTY	Sri SATYA SANKAR RAJ, PRINCIPAL, UCPEs, BERHAMPUR

WEEK	CLASS	TOPICS COVERED	TEACHING METHOD
WEEK 1	1	To acquaint with safety and SOP of Blake Jaw Crusher	Lecture + Demonstration
	2	Study of parts of Blake Jaw Crusher	Demonstration + Discussion
	3	Demonstration of Blake Jaw Crusher	Demonstration
	4	Practice on operation of Blake Jaw Crusher	Practical
WEEK 2	5	Practice on operation of Blake Jaw Crusher	Practical
	6	Determine the strength of standard solution	Practical + Viva
	7	To acquaint with safety and SOP of Ball Mill	Lecture + Demonstration
	8	Study of parts of Ball Mill	Demonstration + Discussion
WEEK 3	9	Demonstration of Ball Mill	Demonstration
	10	Practice on operation of Ball Mill	Practical
	11	Practice on operation of Ball Mill	Practical
	12	Determine Critical speed of ball mill	Practical + Problem Solving
WEEK 4	13	To acquaint with safety and SOP of Vibrating Screen	Lecture + Demonstration
	14	Study of parts of Vibrating Screen	Demonstration + Discussion
	15	Demonstration of Vibrating Screen	Demonstration
	16	Practice on operation of Vibrating Screen	Practical
WEEK 5	17	Practice on operation of Vibrating Screen	Practical
	18	Determine the Screen analysis	Practical + Problem Solving
	19	To acquaint with safety and SOP of Gyratory Sieve Shaker	Lecture + Demonstration
	20	Study of parts of Blake Gyratory Sieve Shaker	Demonstration + Discussion
WEEK 6	21	Demonstration of Gyratory Sieve Shaker	Demonstration
	22	Practice on operation of Gyratory Sieve Shaker	Practical
	23	Practice on operation of Gyratory Sieve Shaker	Practical
	24	Carry Screen analysis	Practical + Problem Solving
WEEK 7	25	To acquaint with safety and SOP of Froth Floatation Cell	Lecture + Demonstration
	26	Study of parts of Froth Floatation Cell	Demonstration + Discussion
	27	Demonstration of Froth Floatation Cell	Demonstration
	28	Practice on operation of Froth Floatation Cell	Practical

WEEK 8	29	Practice on operation of Froth Floatation Cell	Practical
	30	Determine the parameters in Froth Floatation Cell	Practical + Problem Solving
	31	To acquaint with safety and SOP of Cyclone Separator	Lecture + Demonstration
	32	Study of parts of Cyclone Separator	Demonstration + Discussion
WEEK 9	33	Demonstration of Cyclone Separator	Demonstration
	34	Practice on operation of Cyclone Separator	Practical
	35	Practice on operation of Cyclone Separator	Practical
	36	Determine Separation efficiency of Cyclone Separator	Practical + Problem Solving
WEEK 10	37	To acquaint with safety and SOP of Bucket Elevator	Lecture + Demonstration
	38	Study of parts of Bucket Elevator	Demonstration + Discussion
	39	Demonstration of Bucket Elevator	Demonstration
	40	Practice on operation of Bucket Elevator	Practical
WEEK 11	41	Practice on operation of Bucket Elevator	Practical
	42	Maintenance and care of Bucket Elevator	Demonstration + Discussion
	43	To acquaint with safety and SOP of Belt Conveyor	Lecture + Demonstration
	44	Study of parts of Belt Conveyor	Demonstration + Discussion
WEEK 12	45	Demonstration of Belt Conveyor	Demonstration
	46	Practice on operation of Belt Conveyor	Practical
	47	Practice on operation of Belt Conveyor	Practical
	48	Maintenance and care of Bucket Elevator	Demonstration + Discussion
WEEK 13	49	To acquaint with safety and SOP of Plate and Frame Filter Press	Lecture + Demonstration
	50	Study of parts of Plate and Frame Filter Press	Demonstration + Discussion
	51	Demonstration of Plate and Frame Filter Press	Demonstration
	52	Practice on operation of Plate and Frame Filter Press	Practical
WEEK 14	53	Practice on operation of Plate and Frame Filter Press	Practical
	54	Determine the Rate of filtration	Practical + Problem Solving
	55	To acquaint with safety and SOP of Paddle Mixer	Lecture + Demonstration
	56	Study of parts of Paddle Mixer	Demonstration + Discussion
WEEK 15	57	Demonstration of Paddle Mixer	Demonstration
	58	Practice on operation of Paddle Mixer	Practical
	59	Practice on operation of Paddle Mixer	Practical
	60	Maintenance and care of Bucket Elevator	Demonstration + Discussion

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR



DEPARTMENT OF CHEMICAL ENGINEERING LESSON PLAN

SUBJECT	CHEMICAL ENGINEERING DRAWING LAB
SUBJECTCODE	CHEPC217 (PR-4)
SEMESTER	3rd
SESSION	2026 - 2027 (01.07.2026 to 05.11.2026)
NAMEOF FACULTY	Smt. SATARUPA SAHU, LECTURER (STAGE-I), CHEMICAL ENGG.

WEEK	CLASS	TOPICS COVERED	TEACHING METHODS
WEEK 1	1	SHEET-I: Pipe Joints and Fittings – Introduction, Welded Joint and Screw Joint	Lecture + Diagram
	2	Union Joint, Socket and Bends	Lecture + Demonstration
	3	Elbow, Tee and Expander	Demonstration + Diagram
	4	Plug, Welded Neck Flange and Slip-on Flange	Demonstration + Written Practice
WEEK 2	5	SHEET-I: Practice of Pipe Joints and Fittings Symbols	Demonstration + Drawing Practice
	6	SHEET-II: Valve Symbols – Introduction, Gate Valve and Globe Valve	Lecture + Diagram
	7	Ball Valve, Diaphragm Valve and Butterfly Valve	Lecture + Demonstration
	8	Plug Valve, Check Valve and Control Valve	Demonstration + Drawing Practice
WEEK 3	9	SHEET-II: Schematic diagrams of different valves	Demonstration + Drawing Practice
	10	Valve symbols – drawing and identification practice	Written Practice
	11	Valve symbols – application in process diagrams	Discussion + Diagram
	12	Completion and revision of Valve Symbols	Revision + Drawing Practice
WEEK 4	13	SHEET-III: Process Pipeline Symbols – Pipe and Thermally Insulated Pipe	Lecture + Diagram
	14	Jacketed Pipe, Cooled or Heated Pipe	Demonstration + Drawing Practice
	15	Flexible Pipe and process pipeline symbol practice	Demonstration + Written Practice
	16	SHEET-IV: Equipment Symbols – Introduction and Centrifugal Pump	Lecture + Diagram
WEEK 5	17	Gear Pump and Compressor	Lecture + Diagram
	18	Turbine and Vacuum Pump	Demonstration + Drawing Practice
	19	Screw Conveyor and Elevator	Demonstration + Drawing Practice
	20	Condenser and Boiler	Lecture + Diagram

WEEK 6	21	Cyclone Separator and Filter	Demonstration + Diagram
	22	Thickener and Crystallizer	Demonstration + Drawing Practice
	23	Crusher and Dryer	Demonstration + Drawing Practice
	24	Equipment symbols – identification and drawing practice	Written Practice + Revision
WEEK 7	25	SHEET-IV: Centrifugal Pump, Gear Pump and Compressor – detailed sketch practice	Demonstration + Drawing
	26	Turbine, Vacuum Pump, Screw Conveyor and Elevator – sketch practice	Demonstration + Drawing
	27	Condenser, Boiler and Cyclone Separator – sketch practice	Demonstration + Drawing
	28	Filter, Thickener, Crystallizer, Crusher and Dryer – sketch practice	Demonstration + Drawing
WEEK 8	29	SHEET-IV: Completion of Equipment Symbols and Sketches	Drawing Practice
	30	Equipment symbols – correction and finishing	Drawing Practice
	31	Equipment symbols – identification and application	Discussion + Drawing
	32	Revision and assessment of Equipment Symbols	Revision + Written Practice
WEEK 9	33	SHEET-V: Vessel Symbols – Vessel, Open Tank and Closed Tank	Lecture + Diagram
	34	Column, Tank and Tray Column	Demonstration + Drawing Practice
	35	Clarifier, Gas Cylinder and Reaction Vessel	Demonstration + Drawing Practice
	36	Bin and complete Vessel Symbols practice	Drawing Practice + Revision
WEEK 10	37	SHEET-VI: Instrumentation Symbols – Introduction, Flow Controller and Flow Element	Lecture + Diagram
	38	Flow Indicator, Flow Meter, Flow Recorder and Flow Transmitter	Demonstration + Drawing
	39	Level Controller, Level Alarm, Level Indicator, Level Recorder and Level Transmitter	Demonstration + Drawing
	40	Pressure Controller, Pressure Indicator, Pressure Recorder and Pressure Transmitter	Demonstration + Drawing
WEEK 11	41	SHEET-VI: Temperature Controller, Temperature Indicator and Temperature Recorder	Lecture + Diagram
	42	Temperature Transmitter, Transducer and Thermometer	Demonstration + Drawing
	43	Instrumentation symbols – application and identification	Discussion + Drawing Practice
	44	Revision and completion of Instrumentation Symbols	Revision + Written Practice
WEEK 12	45	SHEET-VII: Heat Exchangers – Double Pipe Heat Exchanger: principle and schematic diagram	Lecture + Diagram
	46	Double Pipe Heat Exchanger – detailed schematic drawing	Demonstration + Drawing Practice
	47	Shell & Tube Heat Exchanger – principle and construction	Lecture + Diagram
	48	Shell & Tube Heat Exchanger – schematic diagram	Demonstration + Drawing Practice
WEEK 13	49	SHEET-VII: Completion and comparison of Double Pipe and Shell & Tube Heat Exchangers	Discussion + Drawing Practice
	50	SHEET-VIII: Distillation Column – Introduction and basic process arrangement	Lecture + Diagram
	51	Distillation Column – schematic diagram and major components	Demonstration + Drawing
	52	Distillation Column – complete schematic diagram practice	Drawing Practice + Revision

WEEK 14	53	SHEET-IX: PFD of Chemical Engineering Plant – Introduction to Process Flow Diagram	Lecture + Discussion
	54	Selection of a Chemical Engineering Plant and identification of major equipment	Discussion + Diagram
	55	Preparation of PFD – equipment, pipelines and process connections	Demonstration + Drawing Practice
	56	PFD – symbols, flow direction and process identification	Demonstration + Drawing Practice
WEEK 15	57	SHEET-IX: Completion of PFD of selected Chemical Engineering Plant	Drawing Practice
	58	PFD – correction, labelling and finishing	Drawing Practice
	59	Revision: Pipe, Valve, Pipeline, Equipment, Vessel and Instrumentation Symbols	Discussion + Revision
	60	Final Practical Test / Viva: Heat Exchanger, Distillation Column and PFD	Practical Test + Viva