

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR



DEPARTMENT OF CHEMICAL ENGINEERING LESSON PLAN

SUBJECT	CHEMICAL REACTION ENGINEERING
SUBJECT CODE	CHEPC301 (TH:1)
SEMESTER	5th
ACADEMIC 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
1	1	Introduction to Chemical Reaction Engineering; classification of chemical reactions	Lecture + Discussion
	2	Rate of reaction; definition, units and factors affecting reaction rate	Lecture + Board Work
	3	Rate constant; units of rate constant and relationship between rate and rate constant	Lecture + Tutorial
2	4	Elementary and non-elementary reactions; differences and examples	Lecture + Discussion
	5	Molecularity of reaction; concept and classification	Lecture + Board Work
	6	Order of reaction; determination and comparison with molecularity	Lecture + Tutorial
3	7	Arrhenius equation; effect of temperature on reaction rate	Lecture + Board Work
	8	Activation energy; concept, significance and industrial applications	Lecture + Discussion
	9	Numerical problems on rate constant, Arrhenius equation and activation energy	Tutorial + Problem Solving
4	10	Introduction to interpretation of batch reactor data; integrated rate equations	Lecture + Discussion
	11	Zero-order reaction: integrated rate equation and concentration-time relationship	Lecture + Board Work
	12	Numerical problems on zero-order reaction	Tutorial + Problem Solving
5	13	First-order reaction: integrated rate equation and concentration-time relationship	Lecture + Board Work
	14	Half-life of first-order reaction; derivation and significance	Lecture + Tutorial
	15	Numerical problems on first-order reaction and half-life	Tutorial + Problem Solving
6	16	Second-order reaction: integrated rate equation and concentration-time relationship	Lecture + Board Work
	17	Half-life of second-order reaction; derivation and significance	Lecture + Tutorial
	18	Numerical problems on second-order reaction and half-life	Tutorial + Problem Solving
7	19	Comparison of zero, first and second-order reactions; graphical interpretation	Lecture + Discussion
	20	Constant-volume batch reactor; material balance and	Lecture + Board Work

		concentration relationships	
	21	Variable-volume batch reactor; material balance and concentration relationships	Lecture + Discussion
8	22	Numerical problems on constant-volume batch reactor	Tutorial + Problem Solving
	23	Numerical problems on variable-volume batch reactor	Tutorial + Problem Solving
	24	REVISION – Chemical kinetics and interpretation of batch reactor data	Revision+Question Answer
9	25	Introduction to ideal reactors; classification and characteristics of ideal reactors	Lecture + Discussion
	26	Batch reactor: principle, operation, material balance and performance equation	Lecture + Board Work
	27	Batch reactor: applications and numerical problems	Tutorial + Problem Solving
10	28	Continuous Stirred Tank Reactor (CSTR): principle, operation and characteristics	Lecture + Discussion
	29	CSTR: material balance and performance equation	Lecture + Board Work
	30	Numerical problems on CSTR performance equation	Tutorial + Problem Solving
11	31	Plug Flow Reactor (PFR): principle, operation and characteristics	Lecture + Discussion
	32	PFR: material balance and performance equation	Lecture + Board Work
	33	Numerical problems on PFR performance equation	Tutorial + Problem Solving
12	34	Space velocity, space-time and residence time; definitions and relationships	Lecture + Board Work
	35	Comparison of Batch Reactor, CSTR and PFR; applications and selection	Discussion + Tutorial
	36	REVISION – Ideal reactors, material balance and performance equations	Revision + Q & A
13	37	Catalysis: definition, classification and characteristics of catalysts	Lecture + Discussion
	38	Role of catalyst, promoter, inhibitor and carrier; catalytic activity	Lecture + Board Work
	39	Enzymes as catalysts; catalytic poisoning and industrial applications of catalysts	Lecture + Discussion
14	40	Introduction to chemical equilibrium; reversible reactions and characteristics of equilibrium	Lecture + Discussion
	41	Equilibrium constant and law of mass action	Lecture + Board Work
	42	Le Chatelier's Principle; effect of concentration, pressure and temperature on equilibrium	Lecture + Discussion
15	43	Hess's Law; applications in chemical equilibrium and reaction processes	Lecture + Board Work
	44	Numerical problems on equilibrium constant and chemical equilibrium	Tutorial + Problem Solving
	45	FINAL REVISION / MODEL TEST – Chemical kinetics, batch data, ideal reactors, catalysis and chemical equilibrium	Model Test + Evaluation

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DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN

SUBJECT	MASS TRANSFER – II
SUBJECT CODE	CHEPE303 (TH:2)
SEMESTER	5th
ACADEMIC 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 Methods
WEEK 1	1	Introduction; Wet bulb and dry bulb temperature	Lecture + Discussion
	2	Principle of wet bulb temperature theory	Lecture + Discussion
	3	Humidity – definition, types and importance	Lecture + Discussion
WEEK 2	4	Humidity chart – construction and interpretation	Lecture + Demonstration
	5	Different methods of measurement of humidity	Lecture + Discussion
	6	Different methods of humidification	Lecture + Discussion
WEEK 3	7	Different methods of dehumidification	Lecture + Discussion
	8	Cooling tower – principle and classification	Lecture + Demonstration
	9	Natural draft cooling tower – construction and working	Lecture + Diagram
WEEK 4	10	Mechanical draft cooling tower – construction and working	Lecture + Diagram
	11	Applications of cooling towers and simple numerical problems	Discussion + Tutorial
	12	Concept and importance of drying	Lecture + Discussion
WEEK 5	13	Moisture content – wet basis and dry basis	Lecture + Tutorial
	14	Equilibrium moisture content	Lecture + Discussion
	15	Bound moisture and unbound moisture	Lecture + Discussion
WEEK 6	16	Free moisture and critical moisture content	Lecture + Discussion
	17	Methods of removing liquids from solids	Lecture + Tutorial
	18	Constant-rate drying period	Lecture + Tutorial
WEEK 7	19	Falling-rate drying period	Lecture + Diagram
	20	Drying-rate curve and factors affecting drying rate	Lecture + Discussion
	21	Tray dryer – construction, working principle and applications	Tutorial + Written Practice
WEEK 8	22	Rotary dryer – construction, working principle and	Lecture + Diagram

		applications	
	23	Spray dryer – construction, working principle and applications	Lecture + Diagram
	24	Fluidized-bed dryer – construction, working principle and applications	Lecture + Tutorial
WEEK 9	25	Dryers for heat-sensitive materials	Lecture + Discussion
	26	Simple numerical problems on drying	Lecture + Diagram
	27	Difference between distillation and extraction	Lecture + Discussion
WEEK 10	28	Steps followed in liquid-liquid extraction	Lecture + Diagram
	29	Selection of solvent for extraction	Lecture + Discussion
	30	Distribution coefficient	Tutorial + Written Practice
WEEK 11	31	Mixer-settler for batch operation	Lecture + Discussion
	32	Liquid-liquid extraction equipment – Sieve Tray Tower and Spray Tower	Lecture + Diagram
	33	Packed Tower and Rotating Disk Contactor	Lecture + Discussion
WEEK 12	34	Pulse Column – construction, working and applications	Lecture + Diagram
	35	Applications and comparison of liquid-liquid extraction equipment	Discussion + Tutorial
	36	Principle of leaching	Tutorial + Written Practice
WEEK 13	37	Examples and applications of leaching operations	Lecture + Diagram
	38	Factors affecting the rate of leaching	Lecture + Discussion
	39	Applications of different industrial leaching equipment	Lecture + Discussion
WEEK 14	40	Concept and principle of crystallization	Lecture + Discussion
	41	Supersaturation and mechanism of crystallization	Lecture + Diagram
	42	Yield of crystallization process	Lecture + Discussion
WEEK 15	43	Effect of impurities on crystal formation and caking of crystals	Tutorial + Written Practice
	44	Swenson-Walker crystallizer – construction, working and applications	Lecture + Diagram
	45	Material balance of crystallizer and revision/simple problems	Written Test + Revision

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR



SUBJECT	ENERGY ENGINEERING
SUBJECTCODE	CHEPE301 (A) [TH:4(A)]
SEMESTER	5th
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	TEACHING METHOD
Week 1	1	Unit-I: Fuels – Classification of fuels	Lecture + Discussion
	2	Properties of fuels	Lecture + Discussion
	3	Tests and analysis of fuels	Lecture + Examples
Week 2	4	Coal – Origin and classification	Lecture + Discussion
	5	Coal – Storage and handling	Lecture + Discussion
	6	Coal – Carbonization	Lecture+Diagram-based Explanation
Week 3	7	Coal – Gasification	Lecture+Diagram-based Explanation
	8	Coal – Briquetting	Lecture + Discussion
	9	Gasification of biomass	Lecture + Discussion
Week 4	10	Unit-I revision	Tutorial + Discussion
	11	Class Test – Unit-I	Written Test + Evaluation
	12	Unit-II: Liquid fuels – Petroleum-based fuels	Lecture + Discussion
Week 5	13	Synthetic fuels	Lecture + Discussion
	14	Alcohol and blended fuels	Lecture+ Comparative Study
	15	Storage and handling of liquid fuels	Lecture + Discussion
Week 6	16	Unit-II revision	Tutorial + Discussion
	17	Class Test – Unit-II	Written Test + Evaluation
	18	Unit-III: Gaseous fuels – Water gas and carbureted water gas	Lecture+Diagram-based Explanation
Week 7	19	Producer gas	Lecture+Diagram-based Explanation
	20	Coal gas	Lecture + Discussion
	21	Natural gas	Lecture + Discussion
Week 8	22	Unit-III revision	Tutorial + Discussion
	23	Class Test – Unit-III	Written Test + Evaluation
	24	Unit-IV: Combustion – Introduction and	Lecture + Discussion

		combustion of solid fuels	
Week 9	25	Air requirement for solid fuels	Lecture + Problem Solving
	26	Air requirement for liquid fuels	Lecture + Problem Solving
	27	Air requirement for gaseous fuels	Lecture + Problem Solving
Week 10	28	Combustion equipment	Lecture+Diagram-based Explanation
	29	Unit-IV revision	Tutorial + Problem Solving
	30	Class Test – Unit-IV	Written Test + Evaluation
Week 11	31	Unit-V: Renewable energy – Introduction and Solar energy	Lecture + Discussion
	32	Solar energy – applications	Lecture + Case Study
	33	Wind energy	Lecture+Diagram-based Explanation
Week 12	34	Tidal energy	Lecture + Discussion
	35	Hydropower	Lecture+Diagram-based Explanation
	36	Hydropower – applications	Lecture + Discussion
Week 13	37	Geothermal energy	Lecture + Discussion
	38	Nuclear energy	Lecture+Diagram-based Explanation
	39	Comparative study of renewable energy sources	Comparative Study + Discussion
Week 14	40	Unit-V revision	Tutorial + Discussion
	41	Class Test – Unit-V	Written Test + Evaluation
	42	Comprehensive revision – Units I & II	Tutorial + Discussion
Week 15	43	Comprehensive revision – Units III & IV	Tutorial + Problem Solving
	44	Comprehensive revision – Unit V; Model Paper Discussion	Tutorial + Discussion
	45	Overall revision, doubt clearing and course wrap-up	Revision + Discussion

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR



DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN

SUBJECT	PETROLEUM REFINING AND PETRO CHEMICAL TECHNOLOGY
SUBJECT CODE	CHEPE303 (A) [TH-4(A)]
SEMESTER	5th
ACADEMIC 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	Origin & Formation of Crude Oil	Lecture + Discussion
	2	Composition of Crude Oil	Lecture + Discussion
	3	API Gravity & Flash Point	Lecture + Tutorial
WEEK2	4	Fire Point, Pour Point & Cloud Point	Lecture + Discussion
	5	Smoke Point, Aniline Point & Reid Vapour Pressure	Lecture + Demonstration
	6	Octane Number & Cetane Number	Lecture + Tutorial
WEEK3	7	Dehydration & Desalting of Crude	Lecture + Diagram
	8	General Mechanisms for Removal of Sulphur	Lecture + Discussion
	9	Introduction to Crude Oil Distillation	Lecture + Diagram
WEEK4	10	Atmospheric Distillation – Principle and Process	Lecture + Diagram
	11	Atmospheric Distillation – Products and Applications	Lecture + Discussion
	12	Vacuum Distillation – Principle and Process	Lecture + Diagram
WEEK5	13	Vacuum Distillation – Products and Applications	Lecture + Discussion
	14	Treatment of LPG	Lecture + Discussion
	15	Treatment of Gasoline	Lecture + Diagram
WEEK6	16	Treatment of Kerosene	Lecture + Discussion
	17	Treatment of Diesel	Lecture + Discussion
	18	Treatment of Lube Oils	Lecture + Discussion
WEEK7	19	Properties of ATF and Bitumen	Lecture + Discussion
	20	Polymerisation, Alkylation and isomerisation	Lecture + Discussion
	21	Product from a petroleum refinery	Tutorial + Written Practice
WEEK8	22	Introduction to Secondary Refining Processes	Lecture + Discussion

	23	FCCU – Fluid Catalytic Cracking Unit Overview	Lecture + Diagram
	24	FCCU – Mechanism and Products	Discussion + Diagram
WEEK9	25	Thermal Cracking – Principle and Types	Lecture + Diagram
	26	Hydrocracking – Process and Advantages	Lecture + Diagram
	27	Visbreaking – Purpose and Process	Lecture + Discussion
WEEK10	28	Coking – Types and Applications	Lecture + Diagram
	29	Reforming – Catalytic Reforming Process	Lecture + Discussion
	30	Alkylation – Process and Significance	Tutorial + Written Practice
WEEK 11	31	Isomerization – Process and Importance	Lecture + Discussion
	32	Polymerization – Process and Uses	Lecture + Discussion
	33	Introduction to Petrochemical Industry & Building Blocks	Lecture + Diagram
WEEK12	34	Primary Building Blocks: Methane, Ethane, Propylene, Butadiene	Lecture + Diagram
	35	Secondary Building Blocks & Key Intermediates	Lecture + Discussion
	36	Major Petrochemicals: Aromatics (Benzene, Toluene, Xylene)	Lecture + Diagram
WEEK13	37	Petrochemical Derivatives and Products	Lecture + Discussion
	38	Applications of Major Petrochemicals in Industry	Lecture + Discussion
	39	Chemicals from Methane – Introduction & Feedstock Importance	Lecture + Discussion
WEEK14	40	Chemicals from Methane – Methanol and Derivatives	Lecture + Discussion
	41	Chemicals from Synthesis Gas (CO + H ₂) – Fischer–Tropsch Products	Lecture + Diagram
	42	Chemicals from Olefins – Ethylene Based Products	Lecture + Discussion
WEEK15	43	Chemicals from Olefins – Propylene & Higher Olefin Products	Lecture + Discussion
	44	Chemicals from Aromatics – Benzene, Toluene, Xylenes (BTX)	Lecture + Diagram
	45	Synthetic Fibres – Types and Manufacturing Basics	Written Test + Revision

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR



DEPARTMENT OF CHEMICAL ENGINEERING LESSON PLAN

SUBJECT	CHEMICAL REACTION ENGINEERING LAB
SUBJECT CODE	CHEPC305 (PR:1)
SEMESTER	5th
ACADEMIC 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
1	1	Introduction to Chemical Reaction Engineering Laboratory; laboratory safety, reactor components and general operating procedures	Lecture + Demonstration
	2	Introduction to chemical reactors; classification of Batch, Plug Flow and Mixed Flow reactors	Lecture + Discussion
	3	Introduction to Batch Reactor; principle, construction, components and working	Lecture + Demonstration
	4	Batch Reactor – identification of components, operating procedure and safety precautions	Demonstration+Discussion
2	5	Experiment 1: Demonstration of Batch Reactor operation – start-up procedure and operating conditions	Demonstration
	6	Batch Reactor – practical operation and observation of reactor performance	Practical
	7	Batch Reactor – observation of operating parameters and experimental data recording	Practical + Record Work
	8	Batch Reactor – discussion of observations, applications and precautions	Discussion + Viva
3	9	Batch Reactor – repetition of experimental operation by students	Practical
	10	Batch Reactor – interpretation of experimental observations and performance	Practical + Discussion
	11	Batch Reactor – troubleshooting, operating precautions and common experimental errors	Demonstration + Discussion
	12	Experiment 1 Revision: Batch Reactor operation, observations and viva	Revision + Viva
4	13	Introduction to Plug Flow Reactor (PFR); principle, construction and components	Lecture + Demonstration
	14	Plug Flow Reactor – working principle and operating procedure	Lecture + Demonstration
	15	Experiment 2: Demonstration of Plug Flow Reactor operation	Demonstration
	16	Plug Flow Reactor – identification of components and practical operating procedure	Practical + Discussion
5	17	Plug Flow Reactor – practical operation and observation of reactor performance	Practical
	18	Plug Flow Reactor – observation of operating parameters and experimental data recording	Practical + Record Work
	19	Plug Flow Reactor – interpretation of experimental observations and applications	Practical + Discussion
	20	Plug Flow Reactor – precautions, common errors and troubleshooting	Demonstration + Viva
6	21	Plug Flow Reactor – repetition of experimental operation by students	Practical

	22	Plug Flow Reactor – analysis and discussion of experimental observations	Discussion+Problem Solving
	23	Plug Flow Reactor – comparison with Batch Reactor based on operating characteristics	Discussion + Tutorial
	24	Experiment 2 Revision: Plug Flow Reactor operation, observations and viva	Revision + Viva
7	25	Introduction to Mixed Flow Reactor (CSTR); principle, construction and components	Lecture + Demonstration
	26	Mixed Flow Reactor – working principle and operating procedure	Lecture + Demonstration
	27	Experiment 3: Demonstration of Mixed Flow Reactor operation	Demonstration
	28	Mixed Flow Reactor – identification of components and practical operating procedure	Practical + Discussion
8	29	Mixed Flow Reactor – practical operation and observation of reactor performance	Practical
	30	Mixed Flow Reactor – observation of operating parameters and experimental data recording	Practical + Record Work
	31	Mixed Flow Reactor – interpretation of experimental observations and applications	Practical + Discussion
	32	Mixed Flow Reactor – precautions, common errors and troubleshooting	Demonstration + Viva
9	33	Mixed Flow Reactor – repetition of experimental operation by students	Practical
	34	Mixed Flow Reactor – analysis and discussion of experimental observations	Discussion+Problem Solving
	35	Comparison of Batch, Plug Flow and Mixed Flow Reactors	Discussion + Tutorial
	36	Experiment 3 Revision: Mixed Flow Reactor operation, observations and viva	Revision + Viva
10	37	Introduction to Combined Reactor: Mixed Flow–Plug Flow; principle and arrangement	Lecture + Demonstration
	38	Combined Mixed Flow–Plug Flow Reactor – construction, components and flow arrangement	Lecture + Demonstration
	39	Experiment 4: Demonstration of Mixed Flow–Plug Flow Combined Reactor operation	Demonstration
	40	Mixed Flow–Plug Flow Combined Reactor – practical operating procedure	Practical + Discussion
11	41	Mixed Flow–Plug Flow Combined Reactor – practical operation and observation	Practical
	42	Mixed Flow–Plug Flow Combined Reactor – recording of operating parameters and experimental data	Practical + Record Work
	43	Mixed Flow–Plug Flow Combined Reactor – interpretation of observations and reactor performance	Practical + Discussion
	44	Mixed Flow–Plug Flow Combined Reactor – precautions, troubleshooting and applications	Discussion + Viva
12	45	Mixed Flow–Plug Flow Combined Reactor – repetition of experimental operation by students	Practical
	46	Analysis and discussion of experimental observations	Discussion+Problem Solving
	47	Comparison of Mixed Flow–Plug Flow arrangement with individual reactors	Discussion + Tutorial
	48	Experiment 4 Revision: Mixed Flow–Plug Flow Combined Reactor operation and viva	Revision + Viva
13	49	Introduction to Combined Reactor: Plug Flow–Mixed Flow; principle and arrangement	Lecture + Demonstration
	50	Plug Flow–Mixed Flow Combined Reactor – construction, components and flow arrangement	Lecture + Demonstration
	51	Experiment 5: Demonstration of Plug Flow–Mixed Flow Combined Reactor operation	Demonstration
	52	Plug Flow–Mixed Flow Combined Reactor – practical operating procedure	Practical + Discussion
14	53	Plug Flow–Mixed Flow Combined Reactor – practical operation and observation	Practical
	54	Plug Flow–Mixed Flow Combined Reactor – recording operating parameters and experimental data	Practical + Record Work
	55	Plug Flow–Mixed Flow Combined Reactor – interpretation of observations	Practical + Discussion

		and reactor performance	
	56	Plug Flow–Mixed Flow Combined Reactor – precautions, troubleshooting and applications	Discussion + Viva
15	57	Plug Flow–Mixed Flow Combined Reactor – repetition of experimental operation by students	Practical
	58	Comparison of reactor configurations: Batch, PFR, Mixed Flow and Combined Reactors	Discussion + Tutorial
	59	COMPREHENSIVE REVISION: All five experiments, operating procedures, observations, precautions and applications	Comprehensive Revision + Viva
	60	FINAL PRACTICAL / MODEL VIVA: Experimental performance, laboratory record evaluation and viva-voce	Practical Test + Viva + Evaluation

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR



DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN

SUBJECT	MASS TRANSFER –II LAB
SUBJECT CODE	CHEPC307 (PR:2)
SEMESTER	5th
ACADEMIC 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 METHODS
WEEK1	1	Introduction to Mass Transfer-II Lab, Safety Precautions	Lecture + Discussion
	2	Cooling Tower – Principle and Applications	Lecture + Diagram
	3	Cooling Tower – Construction and Components	Demonstration
	4	Cooling Tower – Experimental Procedure	Demonstration + Practical
WEEK2	5	Cooling Tower – Experimental Operation	Practical
	6	Cooling Tower – Observation and Data Collection	Practical
	7	Cooling Tower – Calculations	Tutorial
	8	Cooling Tower – Result, Viva and Record Writing	Viva + Written Practice
WEEK3	9	Tray Dryer – Principle and Construction	Lecture + Diagram
	10	Tray Dryer – Components and Working	Demonstration
	11	Tray Dryer – Experimental Operation	Practical
	12	Tray Dryer – Observation and Data Collection	Practical
WEEK4	13	Tray Dryer – Drying Calculations	Tutorial
	14	Tray Dryer – Result and Analysis	Discussion
	15	Tray Dryer – Viva and Record Writing	Viva + Written Practice
	16	Fluidized Bed Dryer – Principle and Construction	Lecture + Diagram
WEEK5	17	Fluidized Bed Dryer – Components and Working	Demonstration
	18	Fluidized Bed Dryer – Experimental Operation	Practical
	19	Fluidized Bed Dryer – Observation and Data Collection	Practical
	20	Fluidized Bed Dryer – Calculations	Tutorial
WEEK6	21	Fluidized Bed Dryer – Result and Analysis	Discussion
	22	Fluidized Bed Dryer – Viva and Record Writing	Viva + Written Practice
	23	Open Pan Crystallizer – Principle and Construction	Lecture + Diagram
	24	Open Pan Crystallizer – Components and Working	Demonstration
WEEK7	25	Open Pan Crystallizer – Experimental Operation	Practical
	26	Open Pan Crystallizer – Observation and Data Collection	Practical
	27	Open Pan Crystallizer – Yield Calculation	Tutorial
	28	Open Pan Crystallizer – Result, Viva and Record Writing	Viva + Written Practice
WEEK8	29	Swenson-Walker Crystallizer – Principle and Construction	Lecture + Diagram

	30	Swenson-Walker Crystallizer – Components and Working	Demonstration
	31	Swenson-Walker Crystallizer – Experimental Operation	Practical
	32	Swenson-Walker Crystallizer Observation Data Collection	Practical
WEEK9	33	Swenson-Walker Crystallizer – Yield Calculation	Tutorial
	34	Swenson-Walker Crystallizer – Material Balance	Tutorial
	35	Swenson-Walker Crystallizer – Result and Viva	Viva
	36	Liquid-Liquid Extraction – Principle and Applications	Lecture + Discussion
WEEK10	37	Liquid-Liquid Extraction – Equipment and Components	Lecture + Diagram
	38	Liquid-Liquid Extraction – Experimental Procedure	Demonstration
	39	Liquid-Liquid Extraction – Experimental Operation	Practical
	40	Liquid-Liquid Extraction – Observation Data Collection	Practical
WEEK 11	41	Liquid-Liquid Extraction – Calculations	Tutorial
	42	Liquid-Liquid Extraction – Result and Viva	Viva
	43	Solid-Liquid Extraction – Principle and Applications	Lecture + Discussion
	44	Solid-Liquid Extraction – Equipment and Components	Lecture + Diagram
WEEK12	45	Solid-Liquid Extraction – Experimental Procedure	Demonstration
	46	Solid-Liquid Extraction – Experimental Operation	Practical
	47	Solid-Liquid Extraction – Observation and Data Collection	Practical
	48	Solid-Liquid Extraction – Calculations	Tutorial
WEEK13	49	Solid-Liquid Extraction – Result and Viva	Viva
	50	Revision of Cooling Tower Experiment	Discussion + Practical
	51	Revision of Tray Dryer Experiment	Discussion + Practical
	52	Revision of Fluidized Bed Dryer Experiment	Discussion + Practical
WEEK14	53	Revision of Open Pan Crystallizer Experiment	Discussion + Practical
	54	Revision of Swenson-Walker Crystallizer Experiment	Discussion + Practical
	55	Revision of Liquid-Liquid Extraction Experiment	Discussion + Practical
	56	Revision of Solid-Liquid Extraction Experiment	Discussion + Practical
WEEK15	57	Practical Test – Drying Experiments	Practical Test
	58	Practical Test – Crystallization Experiments	Practical Test
	59	Practical Test – Extraction Experiments	Practical Test
	60	Final Viva, Record Verification and Assessment	Viva + Practical Test

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR



DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN

SUBJECT	FUEL TECHNOLOGY LAB
SUBJECT CODE	CHEPE305 (B) [PR: 3(B)]
SEMESTER	5th
ACADEMIC SESSION	2026 - 2027 (01.07.2026 to 05.11.2026)
NAME OF FACULTY	Smt. SATARUPA SAHU, LECTURER (Stage-I), CHEMICAL ENGG.

WEEK	CLASS	PRACTICAL TOPIC	TEACHING METHOD
Week 1	1	Introduction to Energy Engineering Laboratory; laboratory safety, precautions and general operating procedures	Lecture + Demonstration
	2	Experiment 1: Density, Specific Gravity and API Gravity – principle and definitions	Lecture + Discussion
	3	Study of apparatus and procedure for determination of Density, Specific Gravity and API Gravity	Demonstration+ Discussion
	4	Determination of Density, Specific Gravity and API Gravity of given petroleum/petroleum fraction	Practical
Week 2	5	Determination of Density, Specific Gravity and API Gravity – observation and calculations	Practical + Problem Solving
	6	Record preparation and viva-voce on Experiment 1	Record Work + Viva
	7	Experiment 2: Flash and Fire Point – principle and significance	Lecture + Discussion
	8	Abel's apparatus/Pensky-Martens apparatus – construction and working	Demonstration+ Discussion
Week 3	9	Flash and Fire Point – experimental procedure and precautions	Demonstration+ Discussion
	10	Determination of Flash and Fire Point of given fuel	Practical
	11	Determination of Flash and Fire Point –	Practical

		observation and interpretation	
	12	Record preparation and viva-voce on Experiment 2	Record Work + Viva
Week 4	13	Experiment 3: Cloud Point and Pour Point – principle and significance	Lecture + Discussion
	14	Apparatus, construction and working for determination of Cloud Point and Pour Point	Demonstration+ Discussion
	15	Experimental procedure and precautions	Demonstration+ Discussion
	16	Determination of Cloud Point and Pour Point of lubricating oil	Practical
Week 5	17	Determination of Cloud Point and Pour Point – observation and calculation	Practical
	18	Record preparation and viva-voce on Experiment 3	Record Work + Viva
	19	Experiment 4: Aniline Point – principle and significance	Lecture + Discussion
	20	Apparatus, construction and working for determination of Aniline Point	Demonstration+ Discussion
Week 6	21	Experimental procedure and precautions for Aniline Point determination	Demonstration+ Discussion
	22	Determination of Aniline Point of given fuel	Practical
	23	Observation, calculation and interpretation of Aniline Point	Practical + Problem Solving
	24	Record preparation and viva-voce on Experiment 4	Record Work + Viva
Week 7	25	Experiment 5: Viscosity of oil – principle and significance	Lecture + Discussion
	26	Redwood Viscometer – construction and working	Demonstration+ Discussion
	27	Redwood Viscometer – experimental procedure and precautions	Demonstration+ Discussion
	28	Determination of viscosity of given oil sample using Redwood Viscometer	Practical
Week 8	29	Determination of viscosity – observation and calculations	Practical + Problem Solving
	30	Record preparation and viva-voce on Experiment 5	Record Work + Viva
	31	Experiment 6: Vapour Pressure – principle and significance	Lecture + Discussion
	32	Reid Vapour Pressure Apparatus – construction and working	Demonstration+ Discussion
Week 9	33	Reid Vapour Pressure – experimental procedure and precautions	Demonstration+ Discussion
	34	Determination of vapour pressure of given sample using Reid Vapour Pressure Apparatus	Practical
	35	Observation and interpretation of vapour pressure	Practical
	36	Record preparation and viva on Experiment 6	Record Work + Viva

Week 10	37	Experiment 7: Smoke Point – principle and significance	Lecture + Discussion
	38	Smoke Point Apparatus – construction and working	Demonstration+ Discussion
	39	Experimental procedure and precautions for determination of Smoke Point	Demonstration+ Discussion
	40	Determination of Smoke Point of illuminating oil	Practical
Week 11	41	Determination of Smoke Point – observation and interpretation	Practical
	42	Record preparation and viva-voce on Experiment 7	Record Work + Viva
	43	Experiment 8: Calorific Value – principle and significance	Lecture + Discussion
	44	Bomb Calorimeter – construction and working	Demonstration+ Discussion
Week 12	45	Bomb Calorimeter – experimental procedure and precautions	Demonstration+ Discussion
	46	Determination of calorific value of given fuel using Bomb Calorimeter	Practical
	47	Determination of calorific value – observation and experimental calculations	Practical + Problem Solving
	48	Record preparation and viva-voce on Experiment 8	Record Work + Viva
Week 13	49	Practical revision: Density, Specific Gravity and API Gravity	Practical Revision
	50	Practical revision: Flash and Fire Point	Practical Revision
	51	Practical revision: Cloud Point, Pour Point and Aniline Point	Practical Revision
	52	Practical revision: Viscosity using Redwood Viscometer	Practical Revision
Week 14	53	Practical revision: Vapour Pressure using Reid Vapour Pressure Apparatus	Practical Revision
	54	Practical revision: Smoke Point	Practical Revision
	55	Practical revision: Calorific Value using Bomb Calorimeter	Practical Revision
	56	Comprehensive viva-voce and discussion of all experiments	Viva + Discussion
Week 15	57	Laboratory record verification and correction	Record Work + Discussion
	58	Comprehensive practical assessment	Practical + Evaluation
	59	Doubt clearing, troubleshooting and discussion of experimental errors	Discussion + Evaluation
	60	Final practical examination and viva-voce	Practical+Viva+ Evaluation