| LESSON PLAN OF 3rd SEMESTER(2023-2024) CHEMICAL ENGINEERING | | |
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| Discipline :- CHEMICAL | Semester:-3RD | Name of the Teaching Faculty: **Siddhibinayak Pradhan** |
| Subject:- PHYSICAL CHEMISTRY | No of Days/per Week Class Allotted :-04 | Semester From: -01 August 2023 To: -30 November 2023 |
| **Week** | **Class Day** | **Theory/ Practical Topics** |
| 1st | 1st | **PHYSICAL PROPERTIES OF LIQUIDS**<br>Intermolecular forces in liquid |
| | 2nd | Vapour pressure and its Effect on Temperature and Boiling point |
| | 3rd | Surface Tension |
| | 4th | Viscosity, Measurement of viscosity by Ostwald Method |
| 2nd | 1st | Refractive Index, specific Refraction |
| | 2nd | Determination of Refractive index by Refractometer |
| | 3rd | Optical Activity, measurement of Optical Activity |
| | 4th | Measurements of Optical Activity |
| 3rd | 1st | Solved problems based on physical properties of liquids |
| | 2nd | Chapterwise Test |
| | 3rd | **SOLUTIONS**<br>Solution and types of solutions |
| | 4th | Ways of Expressing concentration |
| 4th | 1st | Solved numerical related to concentration |
| | 2nd | Solutions in Gases in Gases |
| | 3rd | Henry's law and solved problems |
| | 4th | **Solution in liquids in liquids** |
| 5th | 1st | Solubility of partially miscible liquids |
| | 2nd | Solubility of solid in liquid |
| | 3rd | Equilibrium concept, solubility curve |
| | 4th | Raoult's law, ideal solution |
| 6th | 1st | Explanation of lowering of vapour pressure and its measurements |
| | 2nd | Concept of elevation of boiling point and depression of freezing point |
| | 3rd | **OSMOSIS AND OSMOTIC PRESSURE**<br>Osmosis and Osmotic Pressure with Example |
| | 4th | Function of semi-permeable Membrane |
| 7th | 1st | Osmotic pressure and Isotonic pressure |
| | 2nd | Theories of osmosis |
| | 3rd | Reverse osmosis |
| | 4th | The laws of Osmotic Pressure |
| 8th | 1st | Solved problems on Osmosis |

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| | 2nd | Relation betwwen Vapour pressure & Osmotic pressure |
| | 3rd | Relation between Vapour pressure & Osmotic Pressure |
| | 4th | Simple problems |
| 9th | 1st | Surprise Test on chapter-1,2,3 |
| | 2nd | **DISTRIBUTION LAW**<br>Introduction |
| | 3rd | Nernst's Distribution Law |
| | 4th | Equilibrium constant from distribution law |
| 10th | 1st | Solvent Extraction |
| | 2nd | Multiple Extraction |
| | 3rd | Concept of liquid-liquid Chromatography |
| | 4th | Application of Distribution law |
| 11th | 1st | Application of Distribution law |
| | 2nd | Application of Distribution law |
| | 3rd | Numerical problems related to Distribution law |
| | 4th | **COLLOIDS**<br>Colloids and Types of colloidal system |
| 12th | 1st | Characteristics of solutions |
| | 2nd | Applications of colloids |
| | 3rd | Methods of preparation of sols & purifications of sols |
| | 4th | Optical ,kinetic and electrical properties of sols |
| 13th | 1st | Emulsion and types of emulsion |
| | 2nd | Roles of Emulsifier |
| | 3rd | Preparation of Emulsions and there properties |
| | 4th | Gel, types of gel, |
| 14th | 1st | Properties and Application of gel |
| | 2nd | **ADSORPTION**<br>Introduction |
| | 3rd | Types of Adsorption |
| | 4th | Physical adsorption and Chemisorption |
| 15th | 1st | Application of Adsorption |
| | 2nd | Ion – exchange adsorption |
| | 3rd | Compare absorption and adsorption |
| | 4th | Ion – exchange application. |

| LESSON PLAN OF 3rd SEMESTER(2024-25) CHEMICAL ENGINEERING | | |
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| **DISCIPLINE:** CHEMICAL | **Semester:- 3RD** | **NAME OF THE TEACHING FACULTY**<br>**Yayati Kishore Mohanta** |
| **SUBJECT:**<br>FLUID MECHANICS | **No of days perWeek Allotted : 04** | Semester From: -01 August 2023 To: -30 November 2023 |
| **Week** | **Class/ Day** | **Theory/ Practical Topics** |
| 1st | 1st | Units And Dimensions; Fluid and its classification |
| | 2nd | Properties of fluid and its units |
| | 3rd | Newton's law of viscosity |
| | 4th | Newtonian & Non-Newtonian fluid |
| 2nd | 1st | Hydrostatic equilibrium and pressure head |
| | 2nd | Fluid pressure measuring devices |
| | 3rd | Different types of manometers and its applications |
| | 4th | Derivation of manometric equation |
| 3rd | 1st | Problems on Manometric Equation |
| | 2nd | Equation of continuity |
| | 3rd | Problems on Continuity Equation |
| | 4th | Types of fluid flow |
| 4th | 1st | Laminar and turbulent flow |
| | 2nd | Reynolds's number, critical velocity |
| | 3rd | Mechanism of fluid flow in pipes |
| | 4th | Reynolds' experiment |
| 5th | 1st | Bernoulli's theorem, pump work (solve simple problems) |
| | 2nd | Bernoulli's theorem, pump work (solve simple problems) |
| | 3rd | Bernoulli's theorem, pump work (solve simple problems) |
| | 4th | Flow of incompressible fluids in pipe |

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| 6th | 1st | Flow of incompressible fluids in pipe |

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| | 2nd | Flow of incompressible fluids in pipe |
| | 3rd | Friction factor, roughness |
| | 4th | Estimate friction loss in pipes & coils, equivalent length |
| 7th | 1st | Fanning's equation (Solve simple problems) |
| | 2nd | Fanning's equation (Solve simple problems) |
| | 3rd | Friction losses through sudden enlargement in pipes |
| | 4th | Friction losses through sudden contraction in pipes |
| 8th | 1st | Problems on friction losses through sudden enlargement in pipes |
| | 2nd | Problems on friction losses through sudden contraction in pipes |
| | 3rd | Flow of fluids in non-circular conduits. Water hammer |
| | 4th | Working of flow measuring devices, advantages & disadvantages |
| 9th | 1st | Expression for flow measurement through orifice meter |
| | 2nd | Expression for flow measurement through venturi meter |
| | 3rd | Expression for flow measurement through pitot tube |
| | 4th | Working of Rota meter and its calibration |
| 10th | 1st | Simple problems on flow measurement |
| | 2nd | Simple problems on flow measurement |
| | 3rd | Simple problems on flow measurement |
| | 4th | Simple problems on flow measurement |
| 11th | 1st | Concept of transportation of fluid by pipes and tubes |
| | 2nd | Different pipe fittings and its application |
| | 3rd | Different types of valves and their applications |
| | 4th | Classification of pumps |
| 12th | 1st | Construction and working of centrifugal pump |
| | 2nd | Performance characteristics of centrifugal pumps |
| | 3rd | Cavitation, Net positive suction head, Air binding & priming of pump |

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| | 4th | Centrifugal pump troubles and remedies |
| 13th | 1st | Construction and working of centrifugal pump |
| | 2nd | Performance characteristics of centrifugal pumps |
| | 3rd | Working of Piston pump, plunger pump, gear pump, diaphragm pump |
| | 4th | Pumping device for gas: blower, compressor and vacuum devices |
| 14th | 1st | Pressure drop in porous medium |
| | 2nd | Concept of fluidization |
| | 3rd | Types of fluidization |
| | 4th | Minimum fluidization velocity |
| 15th | 1st | Fluidized bed pressure drop |
| | 2nd | Principle of pneumatic conveyance |
| | 3rd | Flow through packed bed; Problems on fluidisation |
| | 4th | Previous Year Questions Practice |

| LESSON PLAN OF 3rd SEMESTER (2023-24) CHEMICAL ENGINEERING DEPARTMENT | | |
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| **Discipline: Chemical** | **Semester: 3rd** | **Name of The Teaching Faculty: Siddhibinayak Pradhan** |
| **Subject: Theory-3**<br><br>**Mechanical Operation** | **No of Days per week class allotted:4** | Semester From: -01 August 2023 To: -30 November 2023<br>**No of Weeks: 15** |
| **Week** | **Class days** | **Theory/Practical Topic** |
| 1st | 1st | Introduction to mechanical operation |
| | 2nd | Objectives of size reduction |
| | 3rd | State laws of crushing like Bonds law, Rittinger's law, Kick's law |
| | 4th | Practice numerical related to different laws |
| 2nd | 1st | Concept of Crushing efficiency, Work index |
| | 2nd | Classification of size reduction equipment and their construction and operation |
| | 3rd | Construction and working of Jaw crusher, Gyratory crusher |
| | 4th | Construction and working of Smooth roll crusher, Hammer Mill, Ball Mill |
| 3rd | 1st | Closed and open circuit grinding, dry grinding |
| | 2nd | Define wet grinding, free and choke grinding |
| | 3rd | Practice of the chapter and solve simple problems |
| | 4th | Practice previous years questions |
| 4th | 1st | Objectives of size separation |
| | 2nd | Shape and size of irregular particle |
| | 3rd | Different types of screen analysis |
| | 4th | Define ideal screen & actual screen |
| 5th | 1st | Material balance over the screen |
| | 2nd | Construction and operation of different types of industrial screens and their effectiveness |
| | 3rd | Construction and operation of different types of industrial screens and their effectiveness |
| | 4th | Construction and operation of air filters, air separator |
| 6th | 1st | Construction and working of cyclone separator, magnetic and Electromagnetic separation |
| | 2nd | Theory of settling like free |

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| | 3rd | Hindered settling |
| | 4th | State Stroke's law, Classification |
| 7th | 1st | Solve simple numerical based on the chapter |
| | 2nd | Theory on Sedimentation, thickeners, clarifiers |

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| | 3rd | Theory on hydraulic classifiers, jigs, classifier riffled table and their use |
| | 4th | Principle & operation of froth floatation and its use |
| 8th | 1st | Revision of the chapter and practice previous year question |
| | 2nd | Types of filtrations, Theory of filtration, |
| | 3rd | Types of cakes, cake resistance, pressure drop, filter medium |
| | 4th | Filter Aids and related derivation |
| 9th | 1st | Classification, constructions and working principles of filtration equipments, Thickeners |
| | 2nd | Classification, constructions and working principles of filtration equipments, Thickeners |
| | 3rd | Batch and continuous centrifuges with their construction, operation |
| | 4th | Uses of batch and continuous centrifuges |
| 10th | 1st | Flocculation, coagulants and role of coagulant in filtration |
| | 2nd | Practice questions based on the chapter |
| | 3rd | Doubt clearing class |
| | 4th | Theory on mixing |
| 11th | 1st | Various mixing operations like Mixing of liquid with liquid |
| | 2nd | Mixing of liquid with solid |
| | 3rd | Mixing of viscous materials |
| | 4th | Mixing of Solid with solid |
| 12th | 1st | Mixing of gases with liquids |
| | 2nd | The flow pattern in agitated vessel |
| | 3rd | Methods of prevention of swirling and vortex formation, baffling |
| | 4th | Different impellers used in mixing operation |
| 13th | 1st | Different propellers, paddles used in mixing operation |
| | 2nd | Revision of the chapter and practice different questions |
| | 3rd | Introduction to transportation and storage |
| | 4th | Objectives of transportation and storage |
| 14th | 1st | Transportation of solid by belt conveyor |
| | 2nd | apron conveyor, screw Conveyor |
| | 3rd | bucket elevators, scrapers and pneumatic conveyers |
| | 4th | Storage and handling of solids |
| 15th | 1st | construction and uses of silos and bins |
| | 2nd | Revision of the chapters |
| | 3rd | Doubt clearing class |

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| | 4th | Practice question answer |

**LESSON PLAN OF CHEMICAL ENGINEERING DEPARTMENT WINTER 2024**

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|---|---|---|
| Discipline: Chemical | Semester: 3rd | Name of Faculty: **Sibasish Mahapatra** |
| Subject: Industrial Stoichiometry (TH-4) | No of Days per week class allotted:4 | Semester From: -01 August 2023 To: -30 November 2023 |
| **Week** | **Class Day** | **Theory Topics** |
| 1st | 1st | **CHAPTER-1: UNITS AND DIMENSIONS** Introduction |
| | 2nd | Basic and derived units used in process industry. |
| | 3rd | Units of physical and chemical properties |
| | 4th | Relation between units and dimension |
| 2nd | 1st | Unit conversion and solve numerical |
| | 2nd | Concepts of unit operation and unit process |
| | 3rd | Application of various graphs in process calculation |
| | 4th | Solve numerical |
| 3rd | 1st | **CHAPTER-2: MOLE CONCEPT** Atomic number, atomic weight of elements |
| | 2nd | Mol. Wt., mole unit, mole fraction (or percent) and mass fraction (orpercent), |
| | 3rd | Relation between mole and mass fraction |
| | 4th | Mole concept with respect to chemical equation. |
| 4th | 1st | Principle of atom conservation. |
| | 2nd | Mole calculation from reaction |
| | 3rd | Methods of expressing composition of mixtures and solutions |
| | 4th | **Solve related numericals** |
| 5th | 1st | **CHAPTER-3: STOICHIOMETRY** Introduction |
| | 2nd | Concept of limiting reactant, Atomic weight, |
| | 3rd | Concept of Molecular weight and empirical formula |
| | 4th | Solved numerical based on limiting reactant, mass-mass and mass volumebasis |
| 6th | 1st | Concepts of Eq. weight, valence of molecule |
| | 2nd | Solve related numerical |
| | 3rd | Concepts of preparation of solution |
| | 4th | Weight and volume percent of solutions |
| 7th | 1st | Basics of Normality, molarity and molality |
| | 2nd | Numerical on solution preparation |
| | 3rd | Solve related numerical |
| | 4th | **CHAPTER-4: GASES AND GASEOUS MIXTURES** |

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| | | Introduction |
| 8th | 1st | Define gases, different gaseous mixture |
| | 2nd | Derivation of Ideal gas equation |
| | 3rd | Derive average molecular weight and Values of R |
| | 4th | Derivation of density of gas mixture |
| 9th | 1st | Solve related numerical |
| | 2nd | Composition by vol% and by weight % related to average molecularweight of gas mixture |
| | 3rd | Solve the examples and exercises related to Avg. mol wt. and Ideal gasequation. |
| | 4th | Concepts of Pressure, partial pressure and various laws related toPVT behavior. |
| 10th | 1st | Concepts of State Raoult's law and Henry's law |
| | 2nd | **CHAPTER-5: MATERIAL BALANCE WITHOUT CHEMICAL REACTION**<br>Introduction |
| | 3rd | Basics of chemical equation and stoichiometry |
| | 4th | Concepts of law of conservation of mass and material balance over thereaction. |
| 11th | 1st | Material balance problems without chemical reactions of unit operations |
| | 2nd | Material balance of Evaporation and solve numerical |
| | 3rd | Material balance of mixing and solve numerical |
| | 4th | Material balance of crystalization |
| 12th | 1st | Material balance over distillation and solve numerical |
| | 2nd | Material balance over drying and solve related numerical |
| | 3rd | Material balance humidification and solve related numerical |
| | 4th | Material balance over filtration |
| 13th | 1st | Material balance over absorption, extraction |
| | 2nd | Solve numerical |
| | 3rd | **CHAPTER-6: MATERIAL BALANCE WITH CHEMICALREACTION**<br>Introduction |
| | 4th | Concepts of Limiting reactant, Excess reactant |
| 14th | 1st | Concepts of Conversion, Selectivity, Yield. |
| | 2nd | Basic concepts involved in material balance calculations. |
| | 3rd | Material balance over combustion |
| | 4th | Material balance over chemical reaction calculation |
| 15th | 1st | Concepts of heat of combustion and heat of formation. |
| | 2nd | Concept of recycle and by pass, purge |
| | 3rd | Excess air and theoretical air |
| | 4th | Numerical based on combustion, Excess air and theoretical air |

**LESSON PLAN OF CHEMICAL ENGINEERING DEPARTMENT WINTER 2024**

| Discipline: Chemical | | Semester: 3rd | Name of Faculty: Satya Sankar Raj | |
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| Subject: Theory-5 Environmental Studies | | No of Days per week class allotted | Semester From: -01 August 2023 To: -30 November 2023 | |
| Week | Class No | Class days | Chapter | Theory Topic |
| | | | **Chapter -1 The Multidisciplinary nature of environmental studies** | |
| 1st | 1 | 1st | 1.1 | Definition & important issues with environmental science |
| | 2 | 2nd | 1.2 | Scope and importance of environmental studies |
| | 3 | 3rd | 1.3 | Components of Environment and its importance |
| | 4 | 4th | 1.4 | Need for public awareness, Institution related to environmental studies |
| | | | **Chapter -2 Natural Resources, Renewable and nonrenewable resource** | |
| 2nd | 5 | 1st | 2.1.1 | Forest resources: Use and over-exploitation, deforestation, case studies, |
| | 6 | 2nd | 2.1.1 | Timber extraction, mining, dams and their effects on forests and tribal people |
| | 7 | 3rd | 2.1.2 | Water resources: Use and over-utilization of surface and ground water, floods, |
| | 8 | 4th | 2.1.2 | Drought, conflicts over water, dam's benefits, and problems |
| 3rd | 9 | 1st | 2.1.3 | Mineral Resources: Use and exploitation, environmental effects of extracting |
| | 10 | 2nd | 2.1.4 | Food Resources: World food problems, changes caused by agriculture |
| | 11 | 3rd | 2.1.4 | Effects of modern agriculture, fertilizers- pesticides problems, water logging |
| | 12 | 4th | 2.1.5 | Energy Resources: Growing energy need, renewable and non-renewable |
| 4th | 13 | 1st | 2.1.6 | Land Resources: Land as a resource, soil erosion, and desertification |
| | 14 | 2nd | 2.2-2.3 | Role of individual in conservation of natural resources, sustainable lifestyles |
| | | | **Chapter -3 Systems** | |
| | 15 | 3rd | 3.1 | Concept of an eco-system, understanding Eco system, Resource Utilization |
| | 16 | 4th | 3.2 | Structure and function of an eco-system- Structural & functional aspects |
| 5th | 17 | 1st | 3.3 | Producers, consumers, decomposers- Examples in eco system |
| | 18 | 2nd | 3.4 | Energy flow in the eco system- examples of different cycles |
| | 19 | 3rd | 3.5 | Ecological succession-examples in eco system |
| | 20 | 4th | 3.6 | Food chains, food webs and ecological pyramids |
| 6th | 21 | 1st | 3.7 | Introduction characteristic function of eco system: Forest ecosystem |
| | 22 | 2nd | 3.8 | Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries) |
| | | | **Chapter -4 Biodiversity and it's Conservation** | |
| | 23 | 3rd | 4.1 | Introduction-Definition: genetics, species, and ecosystem diversity |
| | 24 | 4th | 4.2 | Biogeographically classification of India |

| Week | Class No | Class days | Chapter | Theory Topic |
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| 7th | 25 | 1st | 4.3 | Value of biodiversity: consumptive use, productive use |
| | 26 | 2nd | 4.3 | Social ethical, aesthetic and Option values |
| | 27 | 3rd | 4.4 | Biodiversity at global, national, and local level |
| | 28 | 4th | 4.5 | Threats to biodiversity: Habitats loss, Hot spot of biodiversity |
| 8th | 29 | 1st | 4.5 | poaching of wildlife, man wildlife conflicts, India as megadiversity nation |
| | 30 | 2nd | 4.5 | Conservation of biodiversity-In situ Conservation, Ex situ Conservation |
| | | | **Chapter -5 Environmental Pollution** | |
| | 31 | 3rd | 5.1.1 | Definition Causes, effects, and control measures of air pollution |
| | 32 | 4th | 5.1.2 | Definition Causes, effects, and control measures of water pollution |
| 9th | 33 | 1st | 5.1.3 | Definition Causes, effects, and control measures of soil pollution |
| | 34 | 2nd | 5.1.4 | Definition Causes, effects, and control measures of marine pollution |
| | 35 | 3rd | 5.1.5 | Definition Causes, effects and control measures of noise pollution |
| | 36 | 4th | 5.1.5 | Definition Causes, effects and control measures of thermal pollution |
| 10th | 37 | 1st | 5.1.6 | Definition Causes, effects and control measures of nuclear hazards |
| | 38 | 2nd | 5.2 | Solid waste Management: Causes, effects, and management |
| | 39 | 3rd | 5.2 | Control measures of urban and industrial wastes |
| | 40 | 4th | 5.3 | Role of an individual in prevention of pollution |
| 11th | 41 | 1st | 5.4 | Disaster management: Floods, earthquake and its mitigation measure |
| | 42 | 2nd | 5.4 | cyclone and landslides its mitigation measure |
| | | | **Chapter -6 Social Issues and the Environment** | |
| | 43 | 3rd | 6.1 | Form unsustainable to sustainable development |
| | 44 | 4th | 6.2 | Urban problems related to energy |
| 12th | 45 | 1st | 6.3 | Water conservation, rainwater harvesting, water shed management |
| | 46 | 2nd | 6.4 | Resettlement and rehabilitation of people; its problems and its concern |
| | 47 | 3rd | 6.5 | Environmental ethics: issue and possible solutions |
| | 48 | 4th | 6.6 | Climate change, global warming, acid rain, ozone layer depletion, |
| 13th | 49 | 1st | 6.6 | Nuclear accidents and holocaust, case studies |
| | 50 | 2nd | 6.7 | Air (prevention and control of pollution) Act |
| | 51 | 3rd | 6.8 | Water (prevention and control of pollution) Act |
| | 52 | 4th | 6.9 | Public awareness, Issues related to Environment legislation |
| | | | **Chapter -7 Human population and the environment** | |
| 14th | 53 | 1st | | Population growth and variation among nations |
| | 54 | 2nd | | Population explosion- family welfare program |
| | 55 | 3rd | | Environment and human health, Environmental Health, Climate health |

| Week | Class No | Class days | Chapter | Theory Topic |
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| | 56 | 4th | | Human rights, issues connected with environment and human rights |
| 15th | 57 | 1st | | Value education, Environmental value, valuing nature, valuing culture |
| | 58 | 2nd | | Social Justice, Human heritage, Equitable use of resources |
| | 59 | 3rd | | Common Property resources, Equitable use of resources |
| | 60 | 4th | | Role of information technology in environment and human health |

| LESSON PLAN OF 3rd SEMESTER (2023-24) CHEMICAL ENGINEERING DEPARTMENT | | |
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| **Discipline: Chemical** | **Semester: 3rd** | **Name of The Teaching Faculty: Yayati Kishore Mohanta** |
| **Subject: Practical 5 Chemical Engg. Drawing** | **No of Days per week class allotted:4** | Semester From: -01 August 2023 To: -30 November 2023 |
| **Week** | **Practical days** | **Practical Topic** |
| 1st | 1st | 1.1 Draw symbols of equipment used in chemical industries |
| | 2nd | Draw symbols of equipment used in chemical industries |
| | 3rd | **1.2 Draw symbol of** pipe line |
| | 4th | Valves |
| 2nd | 1st | Pumps |
| | 2nd | Compressor |
| | 3rd | heating cooling arrangements |
| | 4th | Furnaces |
| 3rd | 1st | Boilers |
| | 2nd | Practice symbols |
| | 3rd | process vessels |
| | 4th | Storage vessels |
| 4th | 1st | Driers |
| | 2nd | Separators |
| | 3rd | Filters |
| | 4th | Centrifuge |
| 5th | 1st | Stirrer |
| | 2nd | Feeder |
| | 3rd | Conveyor |
| | 4th | Practice all the symbols |
| 6th | 1st | **2. Draw sketch of Chemical Engineering Equipment like** Heat exchanger (double pipe and shell) |
| | 2nd | Heat exchanger (tube type) |
| | 3rd | Distillation column |

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| | 4th | Dryer |
| 7th | 1st | Evaporator |
| | 2nd | Ball mill |
| | 3rd | Practice the chemical engineering equipments |
| | 4th | Cyclone Separator |
| 8th | 1st | Crystalliser |
| | 2nd | Absorber |
| | 3rd | Extractor |
| | 4th | **3.1 PROCESS INSTRUMENTATION DIAGRAM**<br>Draw symbols of flow rate indictor |
| 9th | 1st | flow recorder |
| | 2nd | Draw symbols of level indicator |
| | 3rd | pH recorder |
| | 4th | level controller |
| 10th | 1st | Class test related to symbols |
| | 2nd | **3.2 Draw P.I. diagrams of**<br>Cooler temperature control |
| | 3rd | Reactor temperature control |
| | 4th | Heater temperature control |
| 11th | 1st | Hot fluid temperature control |
| | 2nd | Practice different control system |
| | 3rd | Evaporator circulation control |
| | 4th | Evaporator circulation control |
| 12th | 1st | Tray dryer control |
| | 2nd | Class test |
| | 3rd | Top temperature control of distillation column |
| | 4th | Top temperature control of distillation column |
| 13th | 1st | Control of level |
| | 2nd | reflux condenser |
| | 3rd | Steam flow rate |
| | 4th | level control of reboiler |
| 14th | 1st | Practice previous diagram |
| | 2nd | Class test |

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| | 3rd | **3.3 Utility Line diagram**<br>Service fluid code for piping |
| | 4th | Utility block diagram for steam |
| 15th | 1st | Utility block diagram for chilled water |
| | 2nd | Practice the diagram |
| | 3rd | Practice the diagram |
| | 4th | Practice the diagram |

| Discipline: Chemical | | Semester: 3rd | Name of Faculty: All Faculty | |
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| Subject: Student Centric Activity | | No of Days per week class allotted-03 | Semester From: -01 August 2023 To: -30 November 2023 | |
| Week | Class No | Class days | | |
| 1st | 1 | 1st | September 4th Week | Orientation Program and Mentor Mentee Meet |
| | 2 | 2nd | | |
| | 3 | 3rd | | |
| 2nd | 4 | 1st | October 2nd week | Poster Making on Emerging trends in different Chemical Industry/Energy Conservation/ |
| | 5 | 2nd | | |
| | 6 | 3rd | | |
| 3rd | 7 | 1st | October 3rd week | Seminar by Industry Expert- latest trend in Plastic Processing- ProprietorSree Plast Limited or Functioning of State Pollution Control Board- RO Regional Office OSPCB |
| | 8 | 2nd | | |
| | 9 | 3rd | | |
| 4th | 10 | 1st | October 4th week | Laboratory Maintenance- 1.Cleaning of equipment,2. Lubrication 3. Running of equipment 4.Removal of residue material 5.Pianting of parts, 6.Arranging glass ware, Chemicals 7. Minor maintenance of equipment |
| | 11 | 2nd | | |
| | 12 | 3rd | | |
| 5th | 13 | 1st | November 1st week | Creativity & Idea Presentation- |
| | 14 | 2nd | | |
| | 15 | 3rd | | |
| 6th | 16 | 1st | November 2nd week | Seminar by Industry Expert- Pharmaceutical Intermediate Processing-Dept of Pharmacy BU/ Roland Institute of pharmacy |
| | 17 | 2nd | | |
| | 18 | 3rd | | |
| 7th | 19 | 1st | November 4th week | Field Visit or Industry visit- JK paper/ Waste Treatment plant Mahuda/SreePlast limited |
| | 20 | 2nd | | |
| | 21 | 3rd | | |
| 8th | 22 | 1st | December 1st week | CV/ Interview preparation/Career Counseling Program |
| | 23 | 2nd | | |
| | 24 | 3rd | | |
| 9th | 25 | 1st | December 2nd week | Laboratory Maintenance-1.Cleaning of equipment,2. Lubrication 3. Running of equipment 4.Removal of residue material 5.Pianting of parts, 6.Arranging glass ware, Chemicals 7. Minor maintenance of equipment |
| | 26 | 2nd | | |
| | 27 | 3rd | | |
| 10th | 28-30 | 1st - 3rd | December 3rd week | Seminar by Industry Expert- From IISER/ CoE BU in the latest area ofresearch |

| LESSON PLAN OF 3rd SEMESTER (2023-24) CHEMICAL ENGINEERING DEPARTMENT | | |
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| **Discipline: Chemical** | **Semester: 3rd** | **Name of The Teaching Faculty: Sibasish Mahapatra** |
| **Subject: Practical-3**<br><br>**Mechanical Operation** | **No of Days per week class allotted:3** | Semester From: -01 August 2023<br><br>To: -30 November 2023 |
| **Week** | **Practical days** | **Practical Topic** |
| 1st | 1st<br>2nd<br>3rd | Demonstrate operation of a Blake type jaw crusher and Verify Rittinger's Law and the capacity of jaw crusher |
| 2nd | 1st<br>2nd<br>3rd | a. Demonstrate operation of a Ball mill<br>b. Find-out the critical speed of a ball mill and compare with the actual speed |
| 3rd | 1st<br>2nd<br>3rd | Determine the effect the number of balls and time of grinding and plot a graph between the no. of balls Vs. Time |
| 4th | 1st<br>2nd<br>3rd | Demonstrate operation of sieve shaker |
| 5th | 1st<br>2nd<br>3rd | determine the average size of the product after performing separation size separation by screen analysis |
| 6th | 1st<br>2nd<br>3rd | Demonstrate operation of vibrating screen & find-out its screen efficiency |
| 7th | 1st<br>2nd<br>3rd | Demonstrate operation of froth flotation cell and Concentrate the given coal sample and find out the ashpresent after and before concentration |
| 8th | 1st<br>2nd<br>3rd | Perform the batch sedimentation test and plot a graph between height of the dead zone and time |

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| 9th | 1st | Demonstrate operation of a magnetic separator |
| | 2nd | |
| | 3rd | |
| 10th | 1st | Demonstrate operation of cyclone separator and estimate its efficiency |
| | 2nd | |
| | 3rd | |
| 11th | 1st | Demonstrate operation of Wilflay table |
| | 2nd | |
| | 3rd | |
| 12th | 1st | Demonstrate operation of a centrifuge |
| | 2nd | |
| | 3rd | |
| 13th | 1st | Demonstrate operation of a classifier |
| | 2nd | |
| | 3rd | |
| 14th | 1st | Determine operation of a paddle mixer |
| | 2nd | |
| | 3rd | |
| 15th | 1st | Demonstrate operation of filter press |
| | 2nd | |
| | 3rd | |

| Discipline: Chemical | | Semester: 3rd | Name of Faculty: Satya Sankar Raj | |
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| Subject: Practical-1 Physical Chemistry Laboratory | | No of Days per week class allotted-04 | Semester From: -01 August 2023 To: -30 November 2023 | |
| Week | Class No | Class days | Chapter | Practical Topic |
| | | | **Experiment no-1** Preparation of standard solution of an acid and alkali | |
| 1st | 1 | 1st | 1.1 | To acquaint with safety and SOP of Chemistry laboratory |
| | 2 | 2nd | 1.2 | To understand the concept of Normality, Molarity and standard solution |
| | 3 | 3rd | 1.3 | Demonstration of experiment |
| | 4 | 4th | 1.4 | Practice on preparation of standard solution |
| 2nd | 5 | 1st | 1.4 | Practice on preparation of standard solution |
| | 6 | 2nd | 1.4 | Determine the strength of standard solution |
| | | | **Experiment no-2** Determine the viscosity of a liquid by Red wood viscometer at different temperatures and plotting graph between viscosity and temperature | |
| | 7 | 3rd | 2.1 | Concept of viscosity and theory of viscosity measurement |
| | 8 | 4th | 2.2 | Description of Viscometer and demonstration of working of viscometer |
| 3rd | 9 | 1st | 2.3 | Demonstration of experiment |
| | 10 | 2nd | 2.4 | Practice on Determination of viscosity of standard oil |
| | 11 | 3rd | 2.4 | Practice on preparation of viscosity of standard oil at different temperature |
| | 12 | 4th | 2.5 | Calculation of viscosity and plotting of graph |
| | | | **Experiment no-3** To determine the partition coefficient of iodine between water andcarbon tetrachloride at room temperature | |
| 4th | 13 | 1st | 3.1 | Study of solubility of solvent in different solvent and its behavior |
| | 14 | 2nd | 3.2 | Nernst's distribution law- statement and explanation, limitation |
| | 15 | 3rd | 3.3 | Demonstration of solvent extraction |
| | 16 | 4th | 3.4 | Determine the partition coefficient of iodine between water and CCl4 |
| 5th | 17 | 1st | 3.4 | Practice on experimental technique of solvent extraction |
| | 18 | 2nd | 3.5 | Calculation, Result, and discussion on partition coefficient of iodine |
| | | | **Experiment no-4** To determine the partition coefficient of benzoic acid between water andbenzene at room temperature and molecular state of Benzoic acid in benzene as compared to its solution in water. | |
| | 19 | 3rd | 4.1 | Study of behavior of benzoic acid between water and benzene |
| | 20 | 4th | 4.2 | Demonstration of Experiment on solvent extraction |
| Week | Class No | Class days | Chapter | Practical Topic |
| 6th | 21 | 1st | 4.3 | Determine partition coefficient of Benzoic acid between water and Benzene |

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| | 22 | 2nd | 4.4 | Practice on experimental technique of solvent extraction |
| | 23 | 3rd | 4.4 | Practice on experimental technique of solvent extraction |
| | 24 | 4th | 4.5 | Calculation, Result, and discussion on partition coefficient of benzoic acid |
| | | | **Experiment no-5** To prepare colloidal solution of starch. | |
| 7th | 25 | 1st | 5.1 | Study on Colloidal state, colloid and types of colloidal system |
| | 26 | 2nd | 5.2 | Study on classification of colloids |
| | 27 | 3rd | 5.3 | Demonstration of Preparation of colloidal solution of starch |
| | 28 | 4th | 5.4 | Preparation of colloidal solution of starch |
| 8th | 29 | 1st | 5.4 | Practice on Preparation of colloidal solution of starch |
| | 30 | 2nd | 5.5 | Result, and discussion, application on colloidal system |
| | | | **Experiment no-6** To prepare colloidal solution of egg albumin | |
| | 31 | 3rd | 6.1 | Study of characteristic of lyophilic sol and lyophobic sol |
| | 32 | 4th | 6.2 | Discussion on different methods of preparation of sols, purification of sols |
| 9th | 33 | 1st | 6.3 | Demonstration of Preparation of colloidal solution of starch |
| | 34 | 2nd | 6.4 | Preparation of colloidal solution of starch |
| | 35 | 3rd | 6.4 | Practice on Preparation of colloidal solution of starch |
| | 36 | 4th | 6.5 | Result, and discussion, application on colloidal system |
| | | | **Experiment no-7** Determine the solubility of a given salt at room temperature and draw itssolubility curve. | |
| 10th | 37 | 1st | 7.1 | Study of solution, solubility, Types, Solution of solids in liquids |
| | 38 | 2nd | 7.2 | Discussion on determination of solubility and solubility curve |
| | 39 | 3rd | 7.3 | Demonstration of the experiment on solubility of a given salt |
| | 40 | 4th | 7.4 | Practice on determine solubility at different temperature |
| 11th | 41 | 1st | 7.4 | Practice on determine solubility at different temperature |
| | 42 | 2nd | 7.5 | Result, and discussion, application of solubility curve |
| | | | **Experiment no-8** To determine the adsorption isotherm of acetic acid by activatedcharcoal. | |
| | 43 | 3rd | 8.1 | Study of Principle of adsorption, type, Comparison |
| | 44 | 4th | 8.2 | Study of adsorption isotherm, plotting, limitations, and assumption |
| 12th | 45 | 1st | 8.3 | Demonstration of the experiment on adsorption of acetic acid by charcoal. |
| | 46 | 2nd | 8.4 | Practice on adsorption of acetic acid by charcoal |
| | 47 | 3rd | 8.4 | Practice on adsorption of acetic acid by charcoal |
| | 48 | 4th | 8.5 | Result, and discussion, application of adsorption isotherm of acetic acid |
| Week | Class No | Class days | Chapter | Practical Topic |

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| | | | **Experiment no-9** To investigate the adsorption of oxalic acid from aqueous solution of activated charcoal and examines the validity of Freundlich and Langmuir's adsorption isotherm | |
| 13th | 49 | 1st | 9.1 | Study of characteristic of Freundlich and Langmuir's adsorption isotherm |
| | 50 | 2nd | 9.2 | Study of plotting of Freundlich and Langmuir's adsorption isotherm |
| | 51 | 3rd | 9.3 | Demonstration of the experiment on adsorption of oxalic acid by charcoal. |
| | 52 | 4th | 9.4 | Practice on adsorption of oxalic acid by charcoal |
| 14th | 53 | 1st | 9.4 | Practice on adsorption of oxalic acid by charcoal |
| | 54 | 2nd | 9.5 | Result, and discussion, application of adsorption isotherms of oxalic acid |
| | | | **Experiment no-10** To determine the rate constant for hydrolysis of ethyl acetatecatalyzed by hydrochloric acid | |
| | 55 | 3rd | 10.1 | |
| | 56 | 4th | 10.2 | |
| 15th | 57 | 1st | 10.3 | Demonstration of the experiment on hydrolysis of ethyl acetate. |
| | 58 | 2nd | 10.4 | Practice on hydrolysis of ethyl acetate |
| | 59 | 3rd | 10.4 | Practice on hydrolysis of ethyl acetate at different time interval |
| | 60 | 4th | 10.5 | Result, and discussion, application of adsorption isotherms of oxalic acid |

**LESSON PLAN OF CHEMICAL ENGINEERING DEPARTMENT WINTER 2024**

| Discipline: Chemical | Semester: 5th | Name of Faculty: Yayati Kishore Mohanta/Siddhibinayak Pradhan |
|---|---|---|
| Subject: Practical-4 Environmental Engineering Laboratory | No of periods per week allotted:3 | Semester From: -01 August 2023 To: -30 November 2023 |
| Week | Experiment | Experiment Topic |
| 1st | 1 | Collection of sample of waste water |
| 2nd | 2 | Analyze a given sample of waste water for estimation of dissolved chloride |
| 3rd | 2 | Analyze a given sample of waste water for estimation of dissolved chloride |
| 4th | 3 | Determine the dissolved oxygen content of water by Winkler's method |
| 5th | 3 | Determine the dissolved oxygen content of water by Winkler's method |
| 6th | 4 | Determine the chemical oxygen demand (BOD) exerted by a given sample of waste water |
| 7th | 4 | Determine the chemical oxygen demand (BOD) exerted by a given sample of waste water |
| 8th | 5 | Determine the chemical oxygen demand (COD) of a given sample of waste water |
| 9th | 5 | Determine the chemical oxygen demand (COD) of a given sample of waste water |
| 10th | 6 | Determine the turbidity of a given sample of waste water |
| 11th | 7 | Determine the total dissolved solid in a given sample of waste water |
| 12th | 7 | Determine the total dissolved solid in a given sample of waste water |
| 13th | 8 | Determine the optimum amount of Coagulant required to treat to turbid water |
| 14th | 8 | Determine the optimum amount of Coagulant required to treat to turbid water |
| 15th | 9 | Determine the amount of sulphate in a given sample of water. |

| Discipline:Chemical | Semester:3rd | Name of Faculty: Yayati Kishore Mohanta | |
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| Subject: Practical-2 Fluid mechanics Engg. Laboratory | No of periods per week allotted:3 | Semester From: -01 August 2023 To: -30 November 2023 | |
| Week | Practical days | Experiment | Experiment Topic |
| 1st | 1st | 1 | Demonstrate operation of different types of manometers |
| 2nd | 1st | 2 | Demonstrate operation of Reynolds's apparatus and find out critical velocity |
| 3rd | 1st | 2 | Demonstrate operation of Reynolds's apparatus and find out critical velocity |
| 4th | 1st | 3 | Verify Bernoulli's equation |
| 5th | 1st | 3 | Verify Bernoulli's equation |
| 6th | 1st | 4 | Demonstrate operation of venturimeter and determine the venturi co-efficient |
| 7th | 1st | 5 | Demonstrate operation of orificemeter and determine the orifice co-efficient |
| 8th | 1st | 6 | Determine co-efficient of friction and friction losses in pipes |
| 9th | 1st | 7 | Demonstrate operation of a Rota meter and determine rate of flow through rota meter |
| 10th | 1st | 8 | Demonstrate the flow over a weir or 'V' notch |
| 11th | 1st | 9 | Demonstrate operation of a fluidized bed column |
| 12th | 1st | 10 | Demonstrate operation of a centrifugal pump and valves |
| 13th | 1st | 11 | Demonstrate operation of Helical Coil and determine pressure drop through the coil. |
| 14th | 1st | 12 | Basic plumbing practice |
| 15th | 1st | 12 | Basic plumbing practice |