LESSON PLAN OF CHEMICAL ENGINEERING DEPARTMENT SUMMER 2024

Discipline: Chemical		Semester: 4th	Name of Faculty: Rasmi Prabha Sahu	
Subject: Theory-1 Organic Chemistry		No of Days per week class allotted	Semester From: 16th JANUARY 2024 to 26th APRIL 2024 No of Week-15	
Week	Class No	Class days	Chapter	Theory Topic
			Chapter -1 IUPAC NOMENCLATURE	
1st	1	1st	1.1-1.2	Scope of organic chemistry. Differentiate between organic compound and inorganic compounds
	2	2nd	1.3-1.4	Importance of organic Chemistry in modern life. Classification and sources of organic compounds
	3	3rd	1.5	IUPAC naming of mono functional and poly functional Organic Compound
	4	4th	1.5	IUPAC naming of mono functional and poly functional Organic Compound.
2nd	5	1st	1.5	IUPAC naming of mono functional and poly functional Organic Compound
	6	2nd	1.6	IUPAC naming of mono functional and poly functional Organic Compound
	7	3rd	1.7	Concept, type and example of isomerism
	8	4th	1.7	Concept, type and example of isomerism
			Chapter -2 ALIPHATIC COMPOUNDS	
3rd	9	1st	2.1	Methods of preparations, properties and uses of CH_4 and C_2H_5.
	10	2nd	2.1	Methods of preparations, properties and uses of CH_4 and C_2H_5.
	11	3rd	2.1	Methods of preparations, properties and uses of CH_4 and C_2H_5.
	12	4th	2.2	Methods of preparations properties of ethylene.
4th	13	1st	2.2	Methods of preparations properties of ethylene.
	14	2nd	2.3	Methods of preparation, properties and uses of acetylene.
	15	3rd	2.3	Methods of preparation, properties and uses of acetylene.
	16	4th	2.4	Methods of preparation properties and uses of methanol and ethanol
5th	17	1st	2.4	Methods of preparation properties and uses of methanol and ethanol
	18	2nd	2.4	Methods of preparation properties and uses of methanol and ethanol
	19	3rd	2.5	Absolute alcohol and denatured alcohol.
	20	4th	2.5	Absolute alcohol and denatured alcohol.

6th	21	1st	2.6	Methods of preparation properties and uses of formic acid and acetic acid.
	22	2nd	2.6	Methods of preparation properties and uses of formic acid and acetic acid.
	23	3rd	2.6	Methods of preparation properties and uses of formic acid and acetic acid.
	24	4th	2.6	Methods of preparation properties and uses of formic acid and acetic acid.
7th	25	1st	2.7	Methods of preparation properties and uses of formaldehyde and acetone.
	26	2nd	2.7	Methods of preparation properties and uses of formaldehyde and acetone.
	27	3rd	2.7	Methods of preparation properties and uses of formaldehyde and acetone.
	28	4th	2.7	Methods of preparation properties and uses of formaldehyde and acetone.
			Chapter -3 AROMATIC COMPOUNDS	
8th	29	1st	3.1	Methods of preparation, properties and uses of (a) Benzene (b) Toluene
	30	2nd	3.1	Methods of preparation, properties and uses of (a) Benzene (b) Toluene
	31	3rd	3.1	Methods of preparation, properties and uses of (a) Benzene (b) Toluene
	32	4th	3.1	Methods of preparation, properties and uses of (a) Benzene (b) Toluene
9th	33	1st	3.2	Methods of preparation, properties and uses of Benzene derivative compound (a) Phenol (b) Benzaldehyde
	34	2nd	3.2	Methods of preparation, properties and uses of Benzene derivative compound (a) Phenol (b) Benzaldehyde
	35	3rd	3.2	Methods of preparation, properties and uses of Benzene derivative compound (a) Phenol (b) Benzaldehyde
	36	4th	3.2	Methods of preparation, properties and uses of Benzene derivative compound (a) Phenol (b) Benzaldehyde
10th	37	1st	3.2	Methods of preparation, properties and uses of Benzene derivative compound (a) Phenol (b) Benzaldehyde
			Chapter -4 CARBOHYDRATES, PROTEINS & FATS	

	38	2nd	4.1	Classification of carbohydrates
	39	3rd	4.1	Classification of carbohydrates
	40	4th	4.1	Classification of carbohydrates
11th	41	1st	4.2	Synthesis and inter conversions of monosaccharides
	42	2nd	4.2	Synthesis and inter conversions of monosaccharides
	43	3rd	4.2	Synthesis and inter conversions of monosaccharides
	44	4th	4.3	Manufacturing properties and uses of glucose, fructose, sucrose, and starch.
12th	45	1st	4.3	Manufacturing properties and uses of glucose, fructose, sucrose, and starch.
	46	2nd	4.3	Manufacturing properties and uses of glucose, fructose, sucrose, and starch.
	47	3rd	4.3	Manufacturing properties and uses of glucose, fructose, sucrose, and starch.
	48	4th	4.3	Manufacturing properties and uses of glucose, fructose, sucrose, and starch.
13th	49	1st	4.4	Preparation, properties and uses of Amino acid
	50	2nd	4.4	Preparation, properties and uses of Amino acid
	51	3rd	4.4	Preparation, properties and uses of Amino acid
	52	4th	4.4	Preparation, properties and uses of Amino acid
14th	53	1st	4.5	Classification of proteins, Peptides
	54	2nd	4.5	Classification of proteins, Peptides
	55	3rd	4.5	Classification of proteins, Peptides
	56	4th	4.6	Properties and uses of proteins
15th	57	1st	4.6	Properties and uses of proteins
	58	2nd	4.7	Sources, Properties and uses of fats.
	59	3rd	4.7	Sources, Properties and uses of fats.
	60	4th	4.7	Sources, Properties and uses of fats.

Discipline: Chemical		Semester: 4TH	Name of Faculty: Siddhibinayak Pradhan	
Subject: Theory-2 Heat Transfer		No of Days per week class allotted-4	Semester From: 16th January 2024 to 26Th April 2024 No of Week-15	
Week	Class No	Class days	Chapter	Theory Topic
			Chapter – 1 : CONDUCTION	
1st	1	1st	1.1	Heat flow concept in conduction
	2	2nd	1.2	Steady state heat flow
	3	3rd	1.2	Unsteady state heat flow
	4	4th	1.3	State Fourier's law of conduction
2nd	5	1st	1.4	Heat flow through single material
	6	2nd	1.5	Heat flow through composite walls
	7	3rd	1.6	Heat flow through cylinder
	8	4th	1.7	Heat flow through spheres
3rd	9	1st	1.8	Heat flow in single and series medium
	10	2nd	1.9	Thermal insulation
	11	3rd	1.9	Critical radius of insulation
	12	4th	1.10	Solve simple numerical problems on conduction
4th	13	1st	1.10	Solve simple numerical problems on conduction
	14	2nd	1.10	Solve simple numerical problems on conduction
	15	3rd	1.10	Solve simple numerical problems on conduction
			Chapter – 2 : CONVECTION AND HEAT EXCHANGER	
	16	4th	2.1	Concept of heat flow by convection
5th	17	1st	2.2	Natural Convection
	18	2nd	2.2	Forced Convection
	19	3rd	2.3	Individual and overall heat transfer coefficient
	20	4th	2.4	Application of dimensional analysis in Convention

6th	21	1st	2.5	Use of Empirical equations for different flow regime
	22	2nd	2.6	Parallels, co current and counter current flow
	23	3rd	2.7	Log mean temperature difference
	24	4th	2.8	Classify heat exchanger
7th	25	1st	2.9	Construction and working of shell and tube heat exchanger
	26	2nd	2.10	Multi pass and single pass heat exchanger
	27	3rd	2.11	Derive energy balance for shell and tube heat exchanger
	28	4th	2.12	Construction and operation of Finned tube heat exchanger
8th	29	1st	2.12	Construction and operation of Plate type heat exchanger
	30	2nd	2.12	Construction and operation of Scrapped surface heat exchanger
	31	3rd	2.13	Heat transfer in agitated vessel
	32	4th	2.14	Define condensation
9th	33	1st	2.15	Drop wise and film type condensation
	34	2nd	2.16	Problems on Heat Exchangers
	35	3rd	2.16	Problems on Heat Exchangers
			Chapter -3 RADIATION	
	36	4th	3.1	Principle of radiation heat transfer
10th	37	1st	3.2	Concept of black body
	38	2nd	3.2	Emissivity and grey body
	39	3rd	3.3	Mono chromatic emissive power
	40	4th	3.3	Derivation of total emissive power
11th	41	1st	3.4	Kirchhoff's law
	42	2nd	3.5	Stefan Boltzmann's law
	43	3rd	3.6	Wien's law and Plank's law
	44	4th	3.7	Estimate heat transfer by radiation

12th	45	1st	3.7	Solve problems on radiation
			Chapter -4 EVAPORATION	
	46	2nd	4.1	Objective of Evaporation
	47	3rd	4.2	Performance, capacity, economy of evaporator
	48	4th	4.2	Performance, capacity, economy of evaporator
13th	49	1st	4.3	Differentiate among various types of evaporators
	50	2nd	4.3	Differentiate among various types of evaporators
	51	3rd	4.4	Construction and operation of standard basket evaporator
	52	4th	4.4	Construction and operation of long tube forced circulation type evaporator
14th	53	1st	4.5	Elementary principle of single and multiple effect evaporators
	54	2nd	4.6	Material and energy balance of single effect evaporators
	55	3rd	4.7	Solve simple problems on evaporators
	56	4th	4.7	Solve simple problems on evaporators
15th	57	1st	4.7	Solve simple problems on evaporators
	58	2nd	4.8	Boiling point elevation
	59	3rd	4.8	Vapour recompression, mechanical recompression and thermal recompression
	60	4th	4.8	Vapour recompression, mechanical recompression and thermal recompression

LESSON PLAN OF 4TH SEMESTER(2023-24) CHEMICAL ENGINEERING		
DISCIPLINE: CHEMICAL	**Semester:-4TH**	**NAME OF THE TEACHING FACULTY** **YK Mohanta**
SUBJECT: TH3 MASS TRANSFER- I	**No of days per Week Allotted : 04**	**No of Weeks:- 15 From 16 Jan to 26 April 2023**
Week	**Class/ Day**	**Theory/ Practical Topics**
1ST	1st	Importance of mass transfer operations
	2nd	General principle of mass transfer operations
	3rd	Classify mass transfer operations
	4th	Molecular diffusion and inter phasediffusion
2ND	1st	Diffusion in gases and liquids
	2nd	Explain Fick's law
	3rd	Explain mass transfer coefficient
	4th	Solve problems on diffusion
3rd	1st	Solve problems on diffusion
	2nd	Types of boiling point diagrams and enthalpy concentration diagrams
	3rd	Vapour- liquid equilibrium
	4th	Relative volatility and derive an expression between □ & x-y
4th	1st	Draw XY data (equilibrium curve) for different system in graph paper
	2nd	Simple distillation & Derivation of Rayleigh's equation
	3rd	Simple distillation & Derivation of Rayleigh's equation
	4th	Solve problems on Rayleigh's equation
5th	1st	Solve problems on Rayleigh's equation
	2nd	Flash distillation and material balance in flash distillation
	3rd	Continuous rectification of binary system
	4th	Continuous rectification of binary system
6th	1st	Construction of rectification column
	2nd	Construction of rectification column
	3rd	Types of trays & re-boiler
	4th	Types of trays & re-boiler
7th	1st	Channeling, weeping, entrainment andflooding
	2nd	Analyze fractionating column by McCabe and Thiele Method and find out feed plate location (solve simple problems)
	3rd	Analyze fractionating column by McCabe and Thiele Method and find out feed plate location (solve simple problems)
	4th	Analyze fractionating column by McCabe

		and Thiele Method and find out feed plate location (solve simple problems)
8th	1st	Analyze fractionating column by McCabe and Thiele Method and find out feed plate location (solve simple problems)
	2nd	Reflux ratio and concept of minimum, optimum and total reflux ratio
	3rd	Reflux ratio and concept of minimum, optimum and total reflux ratio
	4th	Plate efficiency, Murphree's efficiency
9th	1st	Steam distillation and its application
	2nd	Azeotropic Distillation
	3rd	Extractive Distillation
	4th	Solve problems on distillation
10th	1st	Solve problems on distillation
	2nd	Solve problems on distillation
	3rd	Principle of absorption
	4th	Factors affecting rates of absorption
11th	1st	Different equipment used for absorption
	2nd	Different equipment used for absorption
	3rd	Types of packing materials used in absorption
	4th	Regular and Random packing
12th	1st	Loading, flooding and its effect on pressure drop
	2nd	Minimum gas-liquid ratio
	3rd	HETP
	4th	HTU & NTU
13th	1st	Elementary ideas about spray tower
	2nd	Elementary ideas about wetted wall column
	3rd	Solve simple problems on Absorption
	4th	Solve simple problems on Absorption
14TH	1st	Principle of adsorption
	2nd	Types of adsorption
	3rd	Factors affecting adsorption
	4th	Different types of adsorbents
15TH	1st	Nature of adsorbents
	2nd	Elutriation, percolation
	3rd	Industrial application of adsorption
	4th	Construction and operation of Industrial adsorption equipment

LESSON PLAN OF CHEMICAL ENGINEERING DEPARTMENT SUMMER 2024

Discipline: Chemical	Semester: 4th	Name of Faculty: Sibasish Mahapatra	
Subject: Theory-4 Chemical Process Industries	No of Days per week class allotted: 4	No of Weeks:- 15 From 16 Jan to 26 April 2023	
Week	Class days	Chapter	Theory Topic
1st	1st – 1	1	Understanding the concepts of Industries and how it works
	2nd -2		Concept of unit operation
	3rd -3		Unit Process and some examples
	4th -4		General principles applied in studying an industry
2nd	1st – 5		Different types of flow sheets
	2nd -6		How to chose a process technology
	3rd -7		Understanding batch and continuous process
	4th -8		Revision of the topic
3rd	1st – 9	2	Industrial gases and their application
	2nd -10		Manufacturing of hydrogen from propane and its properties
	3rd -11		Producer gas and how it is produced and its properties
	4th -12		Manufacturing of Water gas ; Carbureted Water gas and its properties
4th	1st – 13		Haber's process for manufacturing ammonia and its properties
	2nd -14		Manufacturing of acetylene and its properties
	3rd -15		Revision of the topic
	4th -16	3	Sulfuric acid and its properties

5th	1st – 17		Wide range of applications of sulfuric acid
	2nd -18		Manufacturing of sulfuric acid by DCDA process with a flow sheet
	3rd -19		Major engineering problems involved in the production of sulfuric acid
	4th -20		Nitric acid, its properties and application
6th	1st – 21		Manufacturing of nitric acid by Ammonia oxidation and ostwald's process
	2nd -22		Revision of the topic
	3rd -23	4	Importance of chloro-alkali industry
	4th -24		Applications of soda ash and its properties
7th	1st – 25	5	Applications of Caustic soda and its properties
	2nd -26		Manufacturing of soda ash by Solvay process
	3rd -27		Manufacturing of caustic soda by electrolysis of brine
	4th-28		Different types of electrolytic cells
8th	1st – 29		Revision of the topic
	2nd -30		Manufacture of pulp by sulfate and sulfite process
	3rd -31		Manufacture of paper by wet process
	4th -32		Recovery of chemicals from black liquor
9th	1st – 33		Different types of paper and their applications
	2nd -34		Additives used in the paper industry and their uses
	3rd -35		Revision of the topic
	4th -36	6	Explain different types of cement, its constituents; characteristics
10th	1st – 37		Lime stone beneficiation with a flow sheet
	2nd -38		Manufacturing of Portland cement by wet and dry process

	3rd -39		Additives used in the cement industry and their application
	4th -40		Factors affecting cement industry; importance of mini cement plant
11th	1st – 41		Revision of the topic
	2nd -42	7	Methods of manufacturing cast iron
	3rd -43		Discuss the properties and application of different kinds of iron
	4th -44		Manufacturing of sponge iron
12th	1st – 45		Manufacturing of wrought iron
	2nd -46		Discuss the methods of manufacturing of steel
	3rd -47		Manufacture of alumina from bauxite by Bayer's process
	4th -48		Extraction of alumina by Hoope's process
13th	1st – 49		Manufacture of rare earth elements and their application
	2nd -50		Revision of the topic
	3rd -51	8	Classify different fertilizers
	4th -52		Manufacture Urea with a flow sheet
14th	1st – 53		Manufacture Calcium ammonium nitrate with a flow sheet
	2nd -54		Manufacture Single Super Phosphate with a flow sheet
	3rd -55		Manufacture Triple super phosphate with a flow sheet
	4th -56		Manufacture Ammonium Phosphate with a flow sheet
15th	1st – 57		Manufacture nitrophosphate and sodium phosphate with a flow sheet
	2nd -58		Discuss about mixed fertilizers and additives used in fertilizer industry
	3rd -59		Revision of the topic
	4th -60		Discussion of previous year questions