UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA

LESSON PLAN

DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN

SUBJECT CODE   : TH-3

 NAME   : CPI-II

 BRANCH   : CH

 SEMESTER   :Diploma-V

 CREDIT POINTS   : 4

 NUMBER OF MODULES : 4

 CLASSES REQUIRED   : 60

 PRE-REQUISITE   :   To understand the adequate information about raw materials, describe the chemistry involved and outlines of manufacturing of some organic chemicals and polymers which are of highly significant in daily life.

MODULE-I
Syllabus –
PESTICIDES: 1. Define pesticides, 2. Classify different pesticides, 3. Manufacture of DDT
Objectives:

To understand the definitions & types of pesticides, Chemical reaction and process involved in DDT manufacturing.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
1	Definition of Pesticides	R1	Q.A.1
2	General classification of Pesticides	T1	Q.B.1
3	Classification based on Composition of Pesticides	T1	Q.B.6 Q.C.3
4	Manufacturers of India and Chemical Reactions involved in DDT manufacturing	R1	
5	Flow diagram description of DDT	R1	
6	Process description of manufacturing of DDT	R1	

MODULE-II
PAINTS AND VARNISHES 1. Define paints, varnishes, lacquers, enamels and their components, application, 2. Constituents of paints and their characteristics 3. Manufacturing process of paints and varnishes 4. Latest advances in paint technology
Objectives:

To understand definition and difference between paints, varnishes, lacquers, enamels. To understand the constituents of paint, manufacturing of paint and   varnishes

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
7	Define paints, varnishes, lacquers, enamels	T1, R1	Q.A.(2-8) Q.B.2, Q.B.5
8	Difference between paints and varnishes, Difference between lacquers, enamels	R1	
9	Constituents of paints and their characteristics	T1	
10	Manufacturing process of paints	T1, R1	
11	Manufacturing process of varnishes	R1	
12	Latest advances in paint technology	T1	

MODULE-III
EXPLOSIVES: 1. Define explosives, 2. Classify different explosives, 3.Manufacture of cellulose nitrate, nitroglycerine and dynamite
Objectives:

To understand different terms of explosives and difference between various explosives. To understand manufacturing of cellulose nitrate, nitroglycerine and dynamite.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
13	Definition of explosives and	T1, R1	Q.A.(9-11)

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
	classification		Q.B.3,Q.B.4 Q.C.1,Q.C.2
14	Difference between high and low explosives and their characteristics	T1	
15	Blasting agent and slurry explosive	T1	
16	Manufacturing of cellulose nitrate	R1	
17	Manufacturing of nitro-glycerine	T1	
18	Manufacturing of dynamite	T1	

MODULE-IV

PLASTICS: 1. Manufacturing of phenol formaldehyde with their properties and uses, 2. Manufacturing of urea formaldehyde with their properties and uses, 3. Manufacturing of polyethylene with their properties and uses, 4. Manufacturing of P.V.C with their properties and uses.

Objectives:

To understand classification of polymer and definition of various polymers. To understand manufacturing of phenol formaldehyde, urea formaldehyde, polyethylene and P.V.C with their properties and uses.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
19	Definition of Plastic/Polymer, Classification of Polymer	T1	Q.A.12 Q.B.7 Q.C(4-7)
20	Manufacturing of phenol formaldehyde one step resin method with their properties and uses.	T1	
21	Manufacturing of phenol formaldehyde two step resin method	T1	
22	Manufacturing of urea formaldehyde with their properties and uses	R1	
23	Manufacturing of polyethylene with their properties and uses	T1	
24	Manufacturing of P.V.C with their properties and uses.	R1	

MODULE-V

SYNTHETIC FIBERS: 1 Classify fiber, 2. Manufacturing of Nylon with properties, 3. Manufacturing of Viscose rayon with properties, 4. Manufacturing of Cupro ammonium rayon with properties, 5. Manufacturing of Acetate rayon with properties, 6. Manufacturing of Polyester with properties.

Objectives:

To understand classification of fiber and definition of fiber. To understand manufacturing of Nylon, Viscose rayon, Cupro ammonium rayon, Acetate rayon, Polyester with properties

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
25	Definition of Fiber and Classification fiber	T1, R1	Q.C(8-9)
26	Manufacturing of Nylon with properties	T1	

Lecture no	Topics to be covered		
27	Manufacturing of Viscose rayon with properties	R1	
28	Manufacturing of Cupro ammonium rayon with properties	T1	
29	Manufacturing of Acetate rayon with properties	R1	
30	Manufacturing of Polyester with properties.	T1, R1	

MODULE-VI

RUBBER: 1.Natural and synthetic rubber and their properties, 2. Manufacturing of SBR and their properties, 3. Manufacturing of Nitrile rubber and their properties

Objectives:

To understand classification of rubber and definition of rubber. To understand manufacturing of NBR and SBR with properties

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
31	Natural and synthetic rubber and their properties	T1, R1	Q.A.13 Q.B.15 Q.C.10
32	Flow-sheet description for manufacturing of SBR	T1	
33	Process description of SBR and their properties	T1	
34	Flow-sheet description for manufacturing of NBR	R1	
35	Process description of NBR and their properties	R1	
36	Revision and Quiz Test	T1,R1	

MODULE-VII

SUGAR: 1. Manufacture of cane sugar, 2. Manufacture of industrial alcohol, 3. Classification of alcoholic beverages, 4. Manufacture of Beer.

Objectives:

To understand manufacturing of cane sugar, industrial alcohol alcoholic beverages, Beer.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
37	Flow-sheet description for manufacturing of cane sugar	T1, R1	Q.A.21 Q.A.22 Q.C.11 Q.C.12 Q.C.16
38	Process description of cane sugar and their properties	T1	
39	Flow-sheet description for manufacturing of industrial alcohol	R1	
40	Process description of industrial alcohol and their properties	R1	
41	Classification of alcoholic beverages	T1,R1	

42	Manufacture of Beer	R1	

MODULE-VIII

OILS AND FATS: 1. Classify different types of oil, 2. manufacturing of vegetable oil, 3. Hydrogenation of oil, 4. Latest developments in edible oil production

Objectives:

To understand the classification of oil. To understand extraction and hydrogenation of oil.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
43	Classify different types of oil	T1, R1	Q.A.(16-20) Q.B.14 Q.C.15
44	Flow-sheet description for extraction of oil	T1	
45	Process description for manufacturing of extraction of oil	T1, R1	
46	Flow-sheet description for hydrogenation of oil	T1, R1	
47	Process description for hydrogenation of oil	T1	
48	Latest developments in edible oil production	T1	

MODULE-IX

SOAPS AND DETERGENTS: 1. Define soaps and detergent, 2. Manufacture of soap, 3. Manufacture of detergent

Objectives:

To understand classification of soap and detergent, detergent builders and constituents of detergent. To understand manufacturing of soap and detergent with properties

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
49	Definition soaps and detergent, principle of cleaning	T1, R1	Q.A.14 Q.A.15 Q.B.(9-11) Q.C.13
50	Detergent builders and constituents of detergent	T1	
51	Flow-sheet description for manufacturing of soap	T1, R1	
52	Process description for manufacturing of soap	R1	
53	Flow-sheet description for manufacturing of detergent	T1, R1	
54	Process description for manufacturing of detergent	T1	

MODULE-X

PHARMACEUTICAL INDUSTRY: 1. Classification of pharmaceutical industry, 2. Major pharmaceutical industry in India and their products, 3. manufacture of penicillin by fermentation

Objectives:

To understand the definition and classification of pharmaceutical products. To understand manufacturing of penicillin by fermentation

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)	EXPECTED QUESTIONS TO BE DISCUSSED
55	Definition pharmaceutical products	T1, R1	Q.B.12
56	Classification of pharmaceutical products-I	T1	Q.B.13
57	Classification of pharmaceutical products-II	R1	Q.C.14
58	Major pharmaceutical industry in India and their products	T1,R1	
59	Flow-sheet description for manufacturing of penicillin by fermentation	R1	
60	Process description for manufacturing of penicillin by fermentation	T1	

Course Delivery Plan

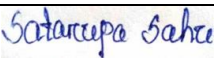| Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
MODULE	1	1&2	2	3	3&4	4	5	5&6	6	7	7&8	8	9	9&10	10

BOOKS FOR REFERENCE:
TEXT BOOKS
T1: Outline of Chemical Technology by Dryden, East West Press Publication.

REFERENCE
R1: Chemical Technology by N Shreeve, Tata Mc Grawhill Publication.

	Prepared by	Approved by
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Date	19th August 2020-18th March 2021	

A. 2 MARKS

1. Define pesticides.
2. Differentiate between paint and varnishes.
3. Differentiate between lacquers and varnishes.
4. Define paints.
5. Define plasticizer.
6. Define varnishes.
7. Define lacquers.
8. Define enamels.
9. Define explosive.
10. Define detonating explosive.
11. Define deflagrating explosive.
12. Define polymer.
13. Differentiate between natural rubber and synthetic rubber.
14. Differentiate between soap and detergent.
15. Differentiate between soft soap and hard soap.
16. Write down the purpose of hydrogenation of oil.
17. Define rancidity.
18. Define iodine value of oil.
19. Define saponification value of oil
20. Define acid value of oil.

B. 5 MARKS

1. Classify the types of pesticides.
2. Write down the constituents of paints and their characteristics.
3. Classify the types of explosives and write down their characteristics.
4. Describe the manufacturing of dynamite with a neat diagram.
5. Describe the manufacturing of titanium oxide paint with the chemical reactions.
6. Differentiate between organo-chlorine and organo-phosphorus insecticides.
7. Differentiate between thermosetting polymer and thermoplastic polymer.
8. Classify fiber.
9. Describe the manufacturing of detergent with a neat diagram.
10. Write down the components of detergent.
11. Write down five name of detergent builders and their uses.
12. Classify the types of Pharmaceutical Products.
13. Write down the types of penicillin products.
14. Describe the hydrogenation of oil with a neat diagram and write down the chemical reactions.

15. Describe the manufacturing of NBR and also write the properties and uses.

C. 10 MARKS

1. Describe the manufacturing of nitro cellulose with a neat diagram.
2. Describe the manufacturing of nitro glycerine with a neat diagram.
3. Describe the manufacturing of DDT with a neat diagram.
4. Describe the manufacturing of phenol formaldehyde with a neat diagram and also write the properties and uses.
5. Describe the manufacturing of urea formaldehyde with a neat diagram and also write the properties and uses.
6. Describe the manufacturing of polyethylene with a neat diagram and also write the properties and uses.
7. Describe the manufacturing of P.V.C with a neat diagram and also write the properties and uses.
8. Describe the manufacturing of Nylon with a neat diagram and also write the properties and uses.
9. Describe the manufacturing of Viscose rayon with a neat diagram and also write the properties and uses.
10. Describe the manufacturing of SBR with a neat diagram and also write the properties and uses.
11. Describe the manufacturing of sugar with a neat diagram
12. Describe the manufacturing of industrial alcohol with a neat diagram.
13. Describe the manufacturing of Soap with a neat diagram.
14. Describe the manufacturing of pencilling with a neat diagram.
15. Describe the extraction of oil with a neat diagram