

DEPARTMENT OF CHEMISTRY				CLASS: I PG				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours/week	CIA	Ext	Total
II	Non-Major Elective	21P2CNM2	Industrial Chemistry and safety measurements	2	2	25	75	100

Nature of Course				
Knowledge and skill	✓		Employability oriented	
Skill oriented			Entrepreneurship oriented	

Objectives: *The objective of this course is to make the student*

- i. *To study about the different types of fertilizers and their role in plant growth.*
- ii. *To know about dye, and its preparations of certain dyes.*
- iii. *To study water pollution and radioactive pollution and control measures.*
- iv. *To study about different types of glass and its raw materials.*
- v. *To know about the safety measures in Industries.*

Unit	Description	Hours	K-level	CLO
I	Fertilizers Plant nutrients – their role in plant growth – classification of fertilizers – Natural and synthetic fertilizers – NPK fertilizers – Complex and Mixed Fertilizers. Examples – Urea – Potassium nitrate – Superphosphate of lime.	6	Up to K2	CLO-1
II	Dye Chemistry Definition – Requisites of a true dye – Chromophores and Auxochrome with examples – Theories of colour . Hair dye materials: natural products hair dye – Godrej, Garnier, Ingredients and preparation of Super Vasmol 33, Vatika.	6	Up to K2	CLO-2
III	Water and Radioactive Pollution Pollution: Introduction – pollution – definition- classification – Water pollution – Water pollutants – acid rain – Greenhouse effect – Ozone layer depletion – control of Water pollution – Radioactive pollution – cause of radioactive materials – control measures.	6	Up to K2	CLO-3
IV	Glass Industry Principal- raw materials used in manufacture of Glass - Effect of different constituents of Glass - special types of Glass - Silica Glass - Borosilicate Glass - Soda lime Glass - Coloured Glass - Safety Glass - Glass wool - Properties of Glass	6	Up to K2	CLO-4
V	Safety measures in Industries General safety and operational rules – Safe handling of chemicals: Gathering general Information on chemicals-Handling and transportation of chemicals-Chemical storage- Fire extinguishers: introduction-classes of fire- Types of fire extinguishers: CO ₂ extinguisher, powder and dry chemical extinguisher.	6	Up to K2	CLO-5

Books for study:

1. The Complete Book on Glass and Ceramics Technology, NIIR board of consultants and Engineers, 1st Edition, Asian Pacific Business Press, 2005
2. Jain & Jain - Engineering Chemistry 15th Edition, Dhanpath Rai publishing company (PVL), New Delhi, 2019.
3. S. S. Dara, S. S. Umare, A Textbook of engineering chemistry, 12th Edition, S. Chand & company ltd. New Delhi, 2004.

Books for Reference:

1. M. G. Arora & M. Singh, Industrial Chemistry, 1st Edition, Anmol Publications, New Delhi, 1998.
2. Sharma, B. K., Industrial chemistry, 1st Edition, Goel Publishing House, 1994.
3. The Chemistry and Application of Dyes Editors: Waring, 1st Edition, David R., Hallas, Geoffrey (Eds.), 1990

Web resources:

1. <https://www.gardeners.com/how-to/fertilizer-ratios>
2. <https://chem.libertexts.org>
3. <https://www.livescience.com/22728-pollution-facts>
4. www.sciencenewsforstudents.org
5. <https://blog.koorsen.com/what-are-the-different-types-of-fire-extinguishers-their-uses>

Rationale for Nature of the course

This course will enable the students to enrich the understanding of basic preparation, properties of fertilizers, Ingredients and preparation of various dyes, water pollution, radioactive pollution and its control measures. Students gain the knowledge about glass industry and its types. They get the information about safety measures in Industries.

Activities having direct bearing on Skill development/Employability/Entrepreneurship

The basic understanding of fertilizers and its classification gained by chart work. The concepts of corrosion and its mechanism were explained by doing small experiments. The removal of hardness, Reverse osmosis, zeolite process was explained by industrial visit.

Pedagogy

- Chalk-Talk Class room Activities
- group Discussion
- seminar
- Quiz through ICT- Mode

Lesson Plan

Unit	Descriptions	Hours	Lecture Mode
I	Fertilizers		
	Plant nutrients – their role in plant growth – classification of fertilizers – Natural and synthetic fertilizers.	2	BB/Animated Video
	NPK fertilizers – Complex and Mixed Fertilizers.	2	BB/PPT/Anim
	Examples – Urea – Potassium nitrate – Superphosphate of lime.	2	BB/PPT
II	Dye Chemistry		
	Definition – Requisites of a true dye – Chromophores and Auxochrome with examples.	2	BB/PPT
	Hair dye materials: natural products hair dye – GodrejGarnier.	2	BB/PPT
	Ingridents and preparation of Super Vasmol 33, Vatika.	2	BB/PPT
III	Water and Radioactive Pollution		
	Pollution: Introduction – pollution – definition- classification Water pollution – Water pollutants	2	BB/PPT
	acid rain – Greenhouse effect – Ozone layer depletion - control of Water pollution	2	BB/Animated video
	Radioactive pollution – cause of radioactive materials – control measures.	2	BB/PPT
IV	Glass Industry		
	Principal- raw materials used in manufacture of Glass - Effect of different constituents of Glass	2	BB/PPT
	Special types of Glass - Silica Glass - Borosilicate Glass - Soda lime Glass - Coloured Glass.	2	BB/PPT
	Safety Glass - Glass wool - Properties of Glass	2	BB
V	Safety measures in Industries		
	General safety and operational rules –Safe handling of chemicals: Gathering general Information on chemicals.	2	BB/PPT
	Handling and transportation of chemicals-Chemical storage- Fire extinguishers: introduction-classes of fire	2	BB/PPT
	Types of fire extinguishers: CO ₂ extinguisher, powder and dry chemical extinguisher.	2	BB/PPT
	Total Hours	30	

Course outcome: After complete successful of this course, the student will be able to

CLOs	CLO statement	Knowledge level
CLO1	Elaborate the importance of fertilizers and its types.	Up to K2
CLO2	Explain the Ingredients and preparation of a dye and preparative methods of	Up to K2
CLO3	Discuss the control measures of water and radioactive pollution.	Up to K2
CLO4	Elaborate the different types of glass and its types.	Up to K2
CLO5	Outline the safety measures in industries.	Up to K2

PLO and CLO Mapping

	PLO-1	PLO -2	PLO -3	PLO -4	PLO-5
CLO-1	1	2	1	2	2
CLO-2	1	1	1	1	1
CLO-3	1	3	1	3	2
CLO-4	1	1	1	1	2
CLO-5	1	1	1	1	1

3-Advance application;

2-Intermediate level;

1-Basic level

Components of Formative Assessment	Marks	K level
Internal Test	10	As per below table
Assignment	5	K2
Quiz	5	K2
Seminar	5	K2
Total	25	

Learning Outcome Based Education(LOBE) & Assessment

Formative Examination I &II-Blue Print

Articulation Mapping - K Levels with Course Outcomes (CLOs)

Units	CLOs	K- Level	Section A		Section B (Either/or Choice)	Section C (Open Choice)
			Short Answers			
			No. of Questions	K- Level		
1	CLO x	Up to K 2	2	K1, K1	2 (K2 &K2)	1(K1)
2	CLO y	Up to K 2	3	K1, K1,K1	2 (K2 &K2)	2(K1, K1)
No. of Questions to be asked			5		4	3
No. of Questions to be answered			5		2	2
Marks for each question			2		5	10
Total Marks for each section			10		10	20

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

**Learning Outcome Based Education (LOBE) & Assessment Summative Examination – Blue Print
Articulation Mapping-K Levels with Courses Learning Outcomes (CLOs)**

Units	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)
			Short answers		Short Answers		
			No. of Questions	K- Level	No. of Questions	K- Level	
1	CLO 1	Up to K 2	1	K1	1	2(K2&K2)	K1
2	CLO 2	Up to K 2	1	K1	1	2(K2&K2)	K1
3	CLO 3	Up to K 2	1	K1	1	2(K2&K2)	K1
4	CLO 4	Up to K 2	1	K1	1	2(K2&K2)	K1
5	CLO 5	Up to K 2	1	K1	1	2(K2&K2)	K1
No. of Questions to be asked			5		5		5
No. of Questions to be answered			5		5		3
Marks for each question			2		7		10
Total Marks for each section			10		35		30

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

Distribution of Section-wise marks with K-levels

K Levels	Section A (No Choice)	Section B (Either / or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated %
K1	10		50	60	46	46
K2	-	70		70	54	54
Total marks	10	70	50	130	100	100

Name of the course Designer

- Dr. R. Sathya