GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL TECHNOLOGY (36)
CHEMISTRY OF INTERMEDIATES & COLORANTS-III
SUBJECT CODE: 2153608
B.E. 5thSEMESTER

Type of Course: Chemical Technology

Prerequisite: Studied subject DP-04 (Chemistry of Intermediates and Colorants-II). Basic knowledge of Chemistry.

Rationale: The main objective of this subject is to study the basic Chemistry applied in synthesis of various types of dyes in chemical industries. This subject provides fundamental knowledge of various types of dyes and how to carry out synthesis of these dyes in chemical industries.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	3	6	70	20	10	20	10	20	150

Content:

Sr. No.	Topic	Teaching Hours	Module Weightage (%)
01.	Disperse Dyes: Introduction, Chemical Constitution: Azo Dyes; Anthraquinone Dyes; Other Chromophores; Synthesis & applications. Chemistry of disperse dyes with special emphasis on environmental safety. Dispersant free disperse dyes. Replacement of anthraquinone disperses dyes – Heterocyclic diazo & coupling components. Styryl & extended styryl disperse dyes.	15	25
02	Reactive Dyes: Introduction, Chemical Constitution of Reactive Systems, Dye Classes (Chromogens) for Reactive Dyes, Synthesis & applications. Chemistry of reactive dyes with special emphasis on environmental issues. High fixation, low salt, highly substantive reactive dyes. Neutral fixing & acid fixing reactive dyes. Heterocyclic reactive systems & multifunctional reactive dyes. Reactive basic dyes.	10	25
03	Fluorescent Whitening Agents (FWA): Introduction, Properties, Classification, Synthesis and Application. Jablonski diagram; Basic concepts of Fluorescence, Phosphorescence and Luminescence systems.	10	25
04	Sulfur Dyes: Introduction, Chemical Constitution, General Synthesis, Principal Properties & applications. Anthraquinone Dyes: Introduction, Chemical Constitution, General Synthesis, Principal Properties & applications.	08	16
5	Leather Dyes: Introduction, Color Selection, Aniline Leather, Pigmented Leather, Colour Index. Paper Dyes: Introduction, Classification of Paper Dyes, Organic Pigments,	08	20

	Special Requirements for Paper Dyes.		

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
60%	**9.8%**	**16.6%**	**6.8%**	**6.8%**	**-**

Reference Books:

1. Industrial Dyes: Chemistry, Properties, Applications by Klaus Hunger- WILEY-VCH Verlag GmbH & Co. 2.
2. Advances in Color Chemistry Vol I to Vol III by Peters A.T – Blackie
3. Colorants for Non – Textile Applications by Freeman - Elseiver, 2000.
4. Modern Colorants: Synthesis and Structure by A T Peters and H S Freeman - Springer, 1995
5. Fundamental Processes of Dye Chemistry by Fierz, David - Blangey, Interscience Publishers, 1955
6. Industrial Organic Chemistry by Arpe H.J.VCH - Weinheim, Weissermal K.1993
7. Chemistry of Synthetic Dyes by Lubs H.A. - Robert E Krieger Publishing Company New York, 1995
8. Chemistry of Synthetic Dyes by Lubs H.A. - Robert E Krieger Publishing Company New York, 1st Ed., 1995.

Course Outcome: After learning this course the students can:

1. To get an introductory knowledge of Chemistry of Dyes.
2. To know the Chemical Constitution, synthesis of various dyes.
3. To be able to apply this knowledge in dyes industries
4. To build a bridge between theoretical and practical concept used in industry

List of Experiments:

1. Synthesis of methyl orange.
2. Synthesis of acid orange-I.
3. Synthesis of acid orange-II.
4. Synthesis of acid Sudan-I.
5. Synthesis of acid Sudan-II.
6. Synthesis of acid Para Red.
7. Synthesis of mono azo disperse dye.
8. Synthesis of heterocyclic disperse dye.
9. Synthesis of reactive dyes.

Design based Problems (DP)/Open Ended Problem:

Application and utility of AMINATION as unit process in Chemical Technology

List of Open Source Software/learning website:

1. Literature available on internet
2. Dyes dictionaries
3. Delnet
4. Literature available under R&D in Dyes industry.

5. Dyes & Pigments journals

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.