GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL TECHNOLOGY (36)
TECHNOLOGY OF DYEING
SUBJECT CODE: 2163608
B.E. 6th SEMESTER

Type of course: Chemical Technology

Prerequisite: **Studied** subject DP-06 (**Technology of Dyeing**) Basic Knowledge of Dyeing Technology.

Rationale: The main objective of this subject is to study the basic Technology applied in of various types of dyes in chemical industries. This subject provides fundamental knowledge of various types of dyes and how to carry out dyeing 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		
4	0	3	7	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs.	% Weightage
1	**Technology of textile fibers:** Classification of colouring matters according to their application to the textile fibers; Physical and chemical structures of fibers and dyes in relation to dyeing; Interaction between dye molecules and the fibers. Dyeing of different dyestuffs onto various natural textile fibers, Rapid dyeing concept, Dye-fiber bonds and parameters affecting them.	12	24
2	**Physicochemical properties of dye-fiber systems:** Thermodynamics of dyeing process; Kinetics of dyeing; Affinity of dyes towards the fibers; Adsorption isotherms; Equilibrium adsorption and factors influencing the same; Saturation value; Diffusion coefficient; Glass transition temperature and its effect on dyeability; Electro-kinetic properties of dye-fiber systems.	14	28
3	**New Tech. in dyeing:** Compatibility of dyes in mixtures; Dyeing of fiber blends and shade matching, Important properties of dyestuffs and their evaluation; Evaluation of fastness properties of dyed materials and their acceptability limits; Novel dyeing techniques.	08	16
4	**Method of dying & dying machineries:** Batch type, semi-continuous and continuous type dyeing machinery for all forms of textiles.	08	16
5	**Recent developments in dyeing techniques:** Introduction, Ultrasonic assisted dyeing, Microwave dyeing etc.	08	16

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
61	**14**	**11**	**7**	**7**	**00**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Handbook of Synthetic Dyes and Pigments, K. M. Shah, Multitech Publishing Company, Bombay, 2nd edition, 1998.
2. Technology of Dyeing, Shenai V.A., Vol. 6, Sevak Publication, Bombay, 2nd edition, 1994.
3. A manual of Dyeing : For use of Practical Dyers, Manufactures, Students and all interested in art of dyeing, E.Knecht, C. Rawson, R.Loewenthal, Charles Griffin and Company Ltd., London, Vol.1,1983.
4. Dyeing and Printing, Cockett S.R., Hilton K.A., Leonard Hill Books Ltd., London, 1961.
5. Rouette Hans-Karl, Encyclopedia of Textile Finishing, Springer-Verlag, Berlin, vol No 2, 1613, (2002).
6. Ramachandran T., Karthik T., and Shetty Guruprasad S., The Indian TextileJournal, 114(9), 23, (2004).

Course Outcome:

1. To get an introductory knowledge of Dyeing Technology.
2. To know the Rapid dyeing concept, physicochemical properties of dye-fiber systems
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. Dyeing of Reactive Red on cotton
2. Dyeing of Reactive Red on wool.
3. Dyeing of Reactive Blue on wool.
4. Dyeing of Reactive Blue on cotton.
5. Dyeing of Reactive Black-5 on wool
6. Dyeing of Reactive Black-5 on cotton
7. Dyeing of Disperse Dye on Polyester
8. Printing of Disperse Red Dye on Polyester.
9. Printing of Disperse yellow Dye on Polyester.
10. Printing of Acid Dye on wool
11. Printing of Acid Dye on polyester.

Design based Problems (DP)/Open Ended Problem:

Students are free to select any area of science and technology based on chemical technology applications to define Projects.

Some suggested projects are listed below:

1. Literature survey on new techniques in Ultrasonic assisted dyeing, Microwave dyeing etc.
2. Lay out design of Ultrasonic assisted dyeing, Microwave dyeing etc

List of Open Source Software/learning website:

- Literature available on internet
- Dyes dictionaries
- Delnet
- Literature available under R&D in Dyes industry.
- 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.