



# GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3163608

Semester – VI

Subject Name: Technology of dyeing

**Type of course:** Chemical Technology

**Prerequisite:** Basic Knowledge of Dyeing Technology.

**Rationale:** The main objective of this subject provides fundamental knowledge of various dyeing technology in chemical industries.

## Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE(E)	PA (M)	ESE (V)	PA(I)		
3	0	2	4	70	30	30	20	150

## Content:

Sr. No.	Content	Total Hrs.	% Weightage
1	<b>Technology of textile fibers:</b> 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.	08	15
2	<b>Physicochemical properties of dye-fiber systems:</b> 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.	08	15
3	<b>Methods of dyeing &amp; dyeing machineries:</b> Basic features of batch dyeing machines, Dyeing machines for loose fibre and sliver, <b>Machines for dyeing yarn:</b> Hank dyeing, Package dyeing machines, <b>Machines for dyeing fabric:</b> Winch dyeing, Jig dyeing machines, Beam dyeing machines, Jet dyeing machines, <b>Continuous dyeing equipment:</b> Padding mangles, The Thermosol process, Roller steamers, Continuous washing units,	12	23
4	<b>Textile Finishing Technology:</b> Preparation, in which the goods are scoured and bleached in readiness for finishing; dyeing or printing; mechanical finishing procedures, usually performed on dry material; thermal processes including drying and heat setting; wet finishing processes in which the goods are treated with solutions of appropriate chemicals and subsequently dried.	08	15
5	<b>Fabric Dyeing Technology:</b> Dyeing of fabric like cellulosic, polyester, cotton, nylon etc.	08	15



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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
35	25	15	10	10	05

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).

Sr. No.	CO statement	Marks % weightage
CO-1	To get an introductory knowledge of textile fibre technology	15
CO-2	To know the Rapid dyeing concept, physicochemical properties of dye-fiber systems	20
CO-3	To understand the methods of dyeing & dyeing machineries	25
CO-4	To elaborate the textile finishing technology	15
CO-5	To be able to understand fabric dyeing technology	15
CO-6	To build a bridge between theoretical and practical concept used in dyes industry	10

## List of Experiments:

1. Dyeing of Acid Dyes on silk fabric.
2. Dyeing of Reactive Dyes on rayon fabric.
3. Dyeing of Disperse Dye on Polyester fabric.



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4. Dyeing of Acid Dye on wool fabric.
5. Dyeing of Basic Dye on various fabric.
6. Dyeing of Direct dyes on cotton fabric.

## **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 dyeing techniques.
2. Lay out design of dyeing techniques.

## **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