

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**COURSE CURRICULUM****COURSE TITLE: DYEING TECHNOLOGY FOR SYNTHETIC TEXTILE****(Code: 3342802)**

Diploma Program in which this course is offered	Semester in which offered
Textile Processing Technology	4 th Semester

1. RATIONALE

Dyeing and printing is one of the most important processes which aids the aesthetic value to the fabric. Many advances has taken place to produce a range of colours and better compositions of dyes, similarly advances are taking place in application of dyes and printing. This course provides the knowledge and skills for dyeing technology of synthetic fiber/ fabrics. It also provides concepts of physical and chemical properties of various dyes and auxiliaries required for the dyeing of synthetic fibre/fabrics. This course additionally provides the information about new dyes to apply and innovation taking place on various synthetic textiles.

2. COMPETENCY

The course content should be taught and curriculum should be implemented with the aim to develop required skills in students so that they are able to acquire following competency:

- **Plan and supervise dyeing processes for dying of synthetic fiber/fabrics using various dyes and methods.**

3. COURSE OUTCOMES (COs)

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Describe the various synthetic fabrics and their dyeing behavior
- Explain dyeing mechanism using various dyes on synthetic fibre/fabrics and their blends.
- Explain dyeing recipes for synthetic fibre/fabrics.
- Explain the working of the dyeing machines used for synthetic fibre/fabrics.
- Explain the process of dyeing of micro Fibres.
- Discuss the innovations done in the field of dyeing of different synthetic fibre/fabrics and their blends.
- Perform dyeing operation on different type of synthetic fibre/fabrics using different methods.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	200
4	-	4	8	70	30	40	60	

Legends: L-Lecture; T – Tutorial/Teacher Guided Student Activity; P - Practical; C – Credit; ESE - End Semester Examination; PA - Progressive Assessment.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Out comes in cognitive domain)	Topics and Sub-topics
Unit – I Fundamentals of dyeing of Synthetic Textiles	1a. Differentiate dyes according to their dyeing methods and properties 1b. Describe affinity of dyes for synthetic textiles 1c. List the parameters for Selection of dyes for dyeing of various synthetic textiles 1d. state the Difference in the dyeing of natural and synthetic fibres.	1.1 Various dyes used for dyeing of synthetic textiles 1.2 Difference in the dyeing of natural and synthetic fibres. 1.3 Selection of dyes for dyeing of various synthetic textiles
Unit– II Application and Mechanism of Various classes of Dyes on synthetic textiles & their blends	2a. Explain Properties and application of different dyes used for Synthetic fibre fabrics 2a1 Describe the Mechanism of dyeing of various synthetic textiles and their blends. 2a2 List the Various parameters affecting the dyeing processes 2a3 Describe the importance of after treatments of dyed material 2b. Describe different auxiliaries used for dyeing process 2c. Explain stripping of various dyes from dyed Material	2.1 Mechanism of dyeing of various synthetic textiles and their blends. 2.2 Methods of dyeing used for various synthetic textiles and their blends 2.3 Role of Different Chemicals and 2.4 auxiliaries used in above dyeing processes 2.5 Various parameters affecting the dyeing processes 2.6 After treatments of dyed material 2.7 Stripping of various dyes from dyed Material

Unit	Major Learning Outcomes (Out comes in cognitive domain)	Topics and Sub-topics
Unit– III Machineries used for Dyeing of synthetic textiles	3a. Describe the Principle of Various dyeing machines used for dyeing of Synthetic textiles 3a1 Describe construction and working machines for dyeing of fabrics. 3a2 State the Merits & demerits of various dyeing machines 3b. Describe various Faults encountered during dyeing on machine.	3.1 Principle, construction and working of Various dyeing machines used for dyeing of Synthetic textiles 3.2 Merits & demerits of various dyeing machines 3.3 Possible faults in various dyeing machines
Unit– IV Dyeing technology for micro fibers	4a. Explain the Preparatory process of Microfibres for dyeing 4a1 Describe the dyeing technology for polyester micro fibres 4b. Explain the different dyeing machineries used for dyeing of micro fibre 4c. Describe the precaution during processing of microfibres	4.1. Preparatory process of Microfibres for dyeing 4.2. Dyeing of polyester microfibre 4.3. Precaution during processing of microfibres
Unit – V Innovations in dyeing of Synthetic textiles	5a. Explain each process, chemistry & technology innovated recently for synthetic dyeing 5b. Describe Solvent Dyeing technique 5c. Explain the use of ultra sonic sound in dyeing	Technology innovated recently for synthetic dyeing 5.1 Solvent Dyeing technique 5.2 Soft flow dyeing technology for woven & knitted textiles 5.3 Use of ultra sonic sound in dyeing 5.4 Super critical carbon dioxide technology in dyeing of synthetic fabrics 5.5 Right First Time (RFT) concept in dyeing control concept applicable in dyeing 5.6 Kuster padding roll technology used in modern dyeing machines

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
1.	Fundamentals of dyeing of Synthetic Textiles	08	2	2	4	08
2.	Application and Mechanism of Various classes of Dyes on synthetic textiles & their blends	20	6	10	12	28

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
3.	Machineries used for Dyeing of synthetic textiles	16	4	6	8	18
4.	Dyeing technology for micro fibres	06	2	2	4	08
5.	Innovations in dyeing of Synthetic textiles	06	2	4	2	08
Total Hrs		56	16	24	30	70

Legends: R = Remember; U=Understand; A = Apply and above levels (Bloom's Revised taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF PRACTICAL/EXERCISES

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes

S. No.	Unit No.	Practical/Exercises (Outcomes in psychomotor domain)	Approx Hrs. required
1	II	Dye nylon with acid dye	02
2	II	Dye nylon with metal complex dye	02
3	II	Dye nylon with reactive dye	02
4	II	Dye nylon with disperse dye	02
5	II	Dye polyester with disperse dye by exhaust method	02
6	II	Dye polyester with disperse dye by HTHP method	02
7	II	Dye polyester with disperse dye by thermosol method	02
8	II	Dye acrylic fabric with cationic dyes	02
9	II	Dye acrylic fabric with disperse dyes	02
10	II	Dye cationic dyeable polyester with cationic dye	02
11	II	Dye cationic dyeable polyester with disperse dye	02
12	II	Dye acetate rayon with disperse dye	02
13	II	Dye polyester/cotton blend with disperse/reactive system	04
14	II	Dye polyester/cotton blend with disperse/vat system	04
15	II	Dye polyester/viscose rayon blend with disperse/reactive system	04
16	II	Dye polyester/viscose rayon blend with disperse/vat system	04
17	II	Visual matching of shades on synthetic and natural fibre/fabrics using	04

		self shades	
18	II	Visual matching of shades on synthetic and natural fibre/fabrics using compound shades	04
19	IV	Dye polyester micro fibre with disperse dye using self shade	02
20	IV	Dye polyester micro fibre with disperse dye using compound shade	02
21	V	Dye polyester micro fibres with disperse dye using combination shade	02
22	V	Dye synthetic textiles using solvent dyeing technique	02
23	V	Dye knitted fabric with various class of dyes	02
24	V	Dye knitted fabric using different combination of dyes	02
Total Hrs			60 Hours

8. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the list of proposed students activities like:

- i. Literature survey of Basic dyeing technology for synthetic textile substrate.
- ii. Collection and Study of different dyes suitable for dyeing of synthetic textile substrate.
- iii. Group discussion on recent textile dyes.
- iv. Collection of data of various textile dyeing process & Power point Presentation.
- v. Seminar/Quiz/Presentation on recent developments in the field of Textile Dyeing.

9. SPECIAL INSTRUCTIONAL STRATEGY (If Any)

- i. Industrial Demonstration for Dyeing process & Machineries as per unit III
- ii. Visual demonstration of dyeing process
- iii. Self assignment
- iv. Guest lecturers from industry experts for contemporary practices of industries.

10. SUGGESTED LEARNING RESOURCES

A. List of Books

Sr. No.	Author	Title of Books	Publication
1.	Dr. V. A. Shenai	Technology of Dyeing (VOLUME-VI)	Sevak Publication
2	E. R. Trotman	Dyeing and Chemical Technology of Textile fibre	Charles Griffin & Co., London
3	R. S. Prayag	Dyeing of wool, silk and man-made fibres	Shree J. Printers, Pune
4.	R. S. Bhagwat	Handbook of Textile Processing Machinery	Colour Publication PVT. LTD., Mumbai
5.	G G Kulkarni & S S Trivedi	Processing of Polyester / Cotton blends	ATIRA Publication
6.	Datya and Vaidya	Chemical processing of Synthetic fibres and blends	ATIRA Publication
7.	Jitendra Kumar	Textile Chemical Processing (Vol.-I)	Pankaj Publication International, Delhi

B. List of Major Equipment/ Instrument

- i. Lab. Winch dyeing machine
- ii. Lab. Jigger dyeing machine
- iii. Water heating bath
- iv. Laboratory Oven
- v. Padding Mangle

C. List of Software/Learning Websites

- i. [en.wikipedia.org/wiki/Textile dyeing](http://en.wikipedia.org/wiki/Textile_dyeing)
- ii. <http://textilefashionstudy.com>
- iii. <http://textilelearner.blogspot.in>
- iv. <http://www.niir.org>

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics**

- **Prof. R D Joshi**, Lecturer, Textile Processing Dept., R C Technical Institute, Ahmedabad.
- **Prof. R G Patel**, Lecturer, Textile Processing Dept., R C Technical Institute, Ahmedabad.
- **Prof. R M Pandya**, Lecturer, Textile Processing Dept., Dr. S & S S Ghandhy College of Engg. & Tech., Surat.
- **Prof. D D Vyas**, Adhoc Lecturer, Textile Processing Dept., Dr. S & S S Ghandhy College of Engg. & Tech., Surat

Coordinator & Faculty members from NITTTR Bhopal

- **Dr. C. K. Chugh**, Professor Department Mechanical Engineering
- **Dr. S. K. Gupta**, Professor and Coordinator for State of Gujarat