GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: QUALITY & PROCESS CONTROL IN WET PROCESSING
(COURSE CODE: 3352802)

Diploma Program in which this course is offered	Semester in which offered
Textile Processing Technology	5th Semester

1. RATIONALE

The polytechnic graduates are required to check and manage quality of finished products in industry. They should have basic knowledge and skills to check/test the quality of bleaching, dyeing, printing and finishing processes with their process parameters. The course on Quality and Process Control in Wet Processing has been designed to provide basic knowledge and skills as well as recent technological developments in the area of Quality and Process control parameters and testing methods of processed goods in textile wet processing.

2. LIST OF COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competency:

- **Manage quality of Grey Fabrics, dyed and printed textiles, and finishing operations by various tests and process controls.**

3. COURSE OUTCOMES

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

i. Describe the planning and implementation Quality and Process control.
ii. Describe the planning and implementation Quality and Process Control in Pretreatment Operations
iii. Describe the planning and implementation Quality and Process Control in Dyeing Operations
iv. Describe the planning and implementation Quality and Process Control in Printing Operations
v. Describe the planning and implementation Quality and Process Control in Finishing Operations
vi. Describe the planning and implementation Health, Safety and Environment in Textile Wet Processing

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
4	0	4	8	70	30	40	60	200

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 (in cognitive domain)	Topics and Sub-topics
Unit – I Introduction to Quality and Process Control	1a. Differentiate Quality, Quality control and Process control. 1b. Distinguish between TQC and TQM system	1.1 Quality, Quality Control, Process control 1.2 Total quality control (TQC) and Total Quality Management (TQM) system
Unit– II Quality and Process Control in Pretreatment Operations	2a. Explain process control for various pretreatment processes 2b. Explain precautions for pretreatment processes 2c. Describe quality control parameters for pretreatment process	2.1 Inspection of Grey Fabric 2.2 Process Control in Pretreatments (Shearing/cropping, Singeing, Desizing, Scouring, Bleaching, Mercerizing etc.) 2.3 Precautions in pre-treatment processes 2.4 Quality Control in Pretreatments (Cupra mmnium fluidity, Copper Number, Barium activity number Test)
Unit– III Quality and Process Control in Dyeing Operations	3a. Explain process control for various dyeing methods and machines 3b. Explain precautions for dyeing processes 3c. Describe quality control parameters for Dyeing	3.1 Process control in dyeing methods and machines 3.2 Precautions required in dyeing of natural, semi – synthetic and synthetic fibre fabric. 3.3 Quality Control in dyeing (various colours' fastness testing methods to different agencies)
Unit– IV Quality and Process Control in Printing Operations	4a. Explain process control for various printing methods and machines 4b. Describe the precautions for printing processes 4c. Explain process control for Fixation machines 4d. Describe the precautions	4.1 Process control in Printing methods and machines 4.2 Precautions required in Printing of natural, semi – synthetic and synthetic fibre/fabrics. 4.3 Process control of various fixation machines 4.4 Precautions required in fixation and

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	for Fixation and after treatments	after treatments
Unit – V Quality and Process Control in Finishing Operations	5a. Explain process control for Finishing 5b. Describe quality control parameters for various Textile Finishes	5.1. Quality Control necessary for various 5.2. Process control in finishing (Mechanical and Chemical) 5.3. Textile Finishes (crease recovery test, feel, shining,Pilling, luster etc.) 5.4. Inspection of final finished fabrics in terms of quality
Unit – VI Health, Safety and Environment in Textile Wet Processing	6a. Describe various hazards in textile wet processing industries 6b. Explain Primary safety measures required in industries 6c. Describe various organization for standard quality certifications	6.1 Various Hazards in Textile wet processing and their remedies (Mechanical, Chemical and Electric) 6.2 Primary safety measures required in textile wet processing 6.3 Organization for standard Quality 6.4 Certification [ISO -9001(Quality), ISO – 14000 (Environment), ISO – 18001 (Occupational Health and Safety Assessment System i.e OHSAS), Global 6.5 Organic Textile Standard (GOTS)] 6.6 Six Sigma Concept

6. SUGGESTED SPECIFICATION TABLE WITH HOURS and MARKS (Theory)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
1.	Introduction to Quality and Process Control	04	2	2	2	06
2.	Quality and Process Control in Pretreatment Operations	12	4	6	6	16
3.	Quality and Process Control in Dyeing Operations	12	4	6	6	16
4.	Quality and Process Control in Printing Operations	10	4	6	4	14
5.	Quality and Process Control in Finishing Operations	10	2	4	4	10
6.	Health, Safety and Environment in Textile Wet Processing	08	2	4	2	08
	Total	**56**	**18**	**28**	**24**	**70**

Legends: R = Remembrance; U= Understanding; A= Application and above levels (Revised Bloom's 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)	Hours
1	II	Identify the different types of strains on grey fabric	02
2	II	Evaluate the efficiency of desizing process	02
3	II	Study the efficiency of scouring process	02
4	II	Study the efficiency of mercerizing process (in terms of dyeing)	04

5	II	Evaluate efficiency of mercerized fabric by cuprammonium fluidity test	04
6	II	Evaluate the efficiency of mercerized fabric by cooper number test	02
7	II	Evaluate the efficiency of mercerized fabric by barium activity number	02
8	II	Evaluate the efficiency of heat setting (iodine absorption test)	02
9	II	Evaluate the efficiency of heat setting (in terms of dyeing)	02
10	III	Perform washing fastness test for various dyes	04
11	III	Perform light fastness test for various dyes	04
12	III	Perform rubbing fastness test for various dyes	02
13	III	Perform sublimation fastness test for various dyes	02
14	III	Perform bleach fastness test for various dyes	02
15	III	Perform perspiration test for various dyes	02
16	IV	Compare various thickening agent in terms of flow property	02
17	IV	Compare various thickening agent in terms of pH	02
18	IV	Compare various thickening agent in terms of stability	02
19	IV	Study fixation methods for printed fabric	04
20	V	Evaluate the efficiency of pre shrinking process (%age shrinkage test)	02
21	V	Evaluate the efficiency of crease resistance finish (crease recovery angle test)	02
22	V	Evaluate the efficiency of water repellant finish (Spray test)	02
23	V	Study the pilling behavior of synthetic fabric	02
24	V	Perform flame test on flame retardant finished fabric	02
25	V	Identify the different types of strains on finished fabric	02
		Total	**60 Hours**

8. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the proposed list of students activities like:

i. Literature survey of Basic and innovative quality control testing methods.
ii. Collection and Study of various instruments used for testing quality parameters
iii. Group discussion on recent development in quality and process control techniques.
iv. Collection of data of various process control parameters and Power point Presentation.
v. Seminar/Quiz/Presentation on recent developments in the field of QC analysis.
vi. Visit to various textile wet processing industries to observe and report.

9. SPECIAL INSTRUCTIONAL STRATEGY (If Any)

i. Industrial Demonstration for Quality checking as per unit II, III, IV and V
ii. Visual demonstration of process control parameters on machines.
iii. Guest lecturers from industry experts for contemporary practices of industries.

10. SUGGESTED LEARNING RESOURCE

A. List of Books

S.No.	Author	Title of Books	Publication
1	S.V. Gokhale and J.R. Modi	Process and Quality Control in Chemical Processing	ATIRA, Ahmedabad
2	---	Orientation Programme in Wet Processing (Quality and Process Control)	BTRA
3	H.V. Mehta	Safety in Textile Industries	ATIRA, Ahmedabad
4	---	Six Sigma – Short term training manual	NITTTR, Bhopal

B. List of Major Equipment/ Instrument with Broad Specification

i. Laboratory Oven/steamer
ii. Padding Mangle
iii. Screen Printing Table and Screens
iv. Crock meter
v. Sublimation fastness tester
vi. Pilling tester

C. List of Software/Learning Websites

i. en.wikipedia.org/wiki/Textile printing
ii. http://textilefashionstudy.com
iii. http://textilelearner.blogspot.in
iv. http://www.niir.org
v. http://en.wikipedia.org/wiki/Quality_control

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. J H Thakker**, Lecturer, Textile Processing Dept., R C Technical Institute, Ahmedabad.
- **Prof. R D Joshi**, Lecturer, Textile Processing Dept., R C Technical Institute, Ahmedabad.
- **Prof. C R Madhu**, Adhoc Lecturer, Textile Processing Dept., R C Technical Institute, Ahmedabad.
- **Prof. D D Vyas**, Adhoc Lecturer, Textile Processing Dept., Dr. S and S S Ghandhy College of Engg. and Tech., Surat.

Coordinator and Faculty Members from NITTTR, Bhopal

- **Dr. C. K. Chugh**, Professor, Department Mechanical Engineering
- **Dr. Joshua Earnest**, Professor, Department Electrical and Electronics Engineering