

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BRANCH NAME: TEXTILE PROCESSING**  
**SUBJECT NAME: COMPUTER AIDED DESIGNING AND COMPUTER COLOUR MATCHING**  
**SUBJECT CODE: 2172802**  
**B.E. 7<sup>th</sup> SEMESTER**

**Type of course:** Textile Processing Engineering

**Prerequisite:** Zeal to learn the subject

**Rationale:** This subject deals with the study of colour theory and its textile application using computer colour matching system. The topics include the quantification of colour, principle and working of spectrophotometer, study of various colour related software, dye formulations using CCMS etc. The subject also includes computer aided designing for printing, Dobby & Jacquard fabric.

## 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)	
					PA	ALA	ESE	OEP		
4	0	3	7	70	20	10	20	10	20	150

**L-** Lectures; **T-** Tutorial/Teacher Guided Student Activity; **P-** Practical; **C-** Credit; **ESE-** End Semester Examination; **PA-** Progressive Assessment; **OEP-** Open Ended problem; **AL-** Active learning.

## Content:

Sr. No.	Content	Total Hrs.	Weightage (%)
1.	Brief discussion of colour science, colour harmony, perception of colour, colour mixing laws metamerism, colour order systems etc.	02	04
2.	Importance of Computer Colour Analysis and Computer Colour Matching., Subjective Shade assessment, Objective Shade assessment, Colour quantification and its practical importance in trade and industry.	04	08
3.	Process of colour quantification, Standardization of source of light. Black Body radiation, Color temperature, Standard observer, Colour matching functions of eye, Expression of colour in terms of Tristimulus values , Merits and demerits ., Chromaticity coordinates, CIE chromaticity diagram its use to locate various CIE illuminant in CIE colour space and distribution of spectrum colours on the CIE space, Towards uniform color space.	08	16
4.	Opponent color coordinates, Hunter Lab system, CIE Lab system, CIE Lch system, Three dimensional presentation of colour using CIE lab system, Equations for measurement of Chroma and hue, Hue circle .	07	14

5.	Colour difference and its measurement using computer colour matching system, Practical Importance of Colour difference measurement, Various systems evolved for colour difference measurement, Equations for calculating colour difference, Practical applications of measuring colour difference like Fastness rating, Pass-Fail program, Shade sorting etc. Database Preparation, Formulation and process of computation for generating match recipe and Batch correction using CCMS.	9	16
6	Database Preparation, Formulation and process of computation for generating match recipe, Batch correction using CCMS. Whiteness Yellowness measurement, Various systems and Indices for measurement of whiteness and yellowness.	04	08
7	Colour Strength Analysis, Mesuring strength of colour on solid substrate Kubelka Munk Equation, K/S values, Pseudo tristimulus values etc., Measuring strength of colour in solution ,	04	08
8	Computer aided designing for printed fabrics. Scanning, colour separation, separation of printing, interface, combination etc.	07	14
9	Computer aided designing for Dobby & Jacquard fabrics.	07	14

### Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
12	14	14	8	8	14

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create 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.

### Reference Books:

1. Instrumental Colour Measurement & Computer Aided Colour Matching- H. S. Shah and R. S. Gandhi
2. Computer Colour Analysis- A. D. Sule
3. Watson-Textile Design & Colour- Z. Grosicki
4. CAD in Clothing & Textiles - Winifred Aldrich
5. Compure colour matching system - N.S. Gangakhedkar

### Course Outcome:

After learning the course the students should be able to:

1. Understand the concept of colour quantification.
2. Prepare data base of different dyes on CCMS for dyeing recipe formulations.
3. Formulate the dyeing recipe using CCMS.
4. Able to analyze the fastness properties using CCMS.
5. Process and prepare designs for making printing screens.
6. Process and prepare designs for making doobby and jacquard fabrics.

**List of Experiments:**

1. To study various parts and functioning of spectrophotometer of CCM Systems.
2. To study the use of CCMS system, both software and hardware, for performing various tasks related to textile trade and industry.
3. To prepare the database of different reactive dyes on cotton fabric. (Part-I)
4. To prepare the database of different reactive dyes on cotton fabric. (Part-II)
5. To prepare the database of different reactive dyes on Polyester fabric. (Part-I)
6. To prepare the database of different reactive dyes on Polyester fabric. (Part-II)
7. To produce match recipe on cotton fabric using formulation/Batch correction option of CCMS using the prepared database.
8. To produce match recipe on polyester fabric using formulation/Batch correction option of CCMS using the prepared database.
9. To prepare chart of mixture shades of Secondary Colours Using Two Primary Colours, viz., Yellow & Blue with Reactive Dyes on cotton.
10. To prepare chart of mixture shades of Secondary Colours Using Two Primary Colours, Viz., Yellow & Red with Reactive Dyes on cotton.
11. To produce match recipe using shade cards of mixture shades (Green range) on Cotton
12. To produce match recipe using shade cards of mixture shades (Orange range) on Cotton.
13. To prepare a chart of mixture shades of Secondary Colours Using Two Primary Colours, Viz., Yellow & Red with Disperse Dyes on polyester.
14. To produce match recipe using shade card of mixture shades.(Orange range) on Polyester.
15. Design and Print Development and Separation of Print Using CAD System.
16. Computer Aided Pattern Development for Different Types Of Weaves Like Dobby, Jacquard, Twills etc.

**Design based Problems (DP)/Open Ended Problem:**

1. To prepare a model of spectrophotometer showing various components and as an important hardware for CCMS.
2. To prepare models of Double beam and dual beam spectrophotometer.
3. To Prepare models of various viewing geometries.
4. To prepare a model showing all the hardware components of CCMS and their electrical connections.
5. To Design a chart showing applications of Computer Colour Matching System in Textile Processing Industry.
6. To develop any design for printing it on fabric to be used for making curtains. The said fabric is to be printed on rotary printing machine.
7. To develop designs using geometrical motifs for printing it on fabric to be used for making kids wear. The said fabric is to be printed with flat bed screen printing machine.
8. To develop an imitation of Kalamkari Saree design to be printed on fabric using digital printing machine.

**Major Equipments:** Water heating bath, Laboratory H.T.H.P beaker dyeing machine, Laboratory Hank Dyeing machine, CCM system, CAD system, scientific balance etc.

**List of Open Source Software/learning website:**

1. <http://www.wto.org/>
2. <http://www.wtin.com/>
3. <http://textileinformation.blogspot.in/>

4. <http://www.fibre2fashion.com/>
5. <http://textilelearner.blogspot.in/>
6. <http://www.fashion-era.com/>

**ACTIVE LEARNING ASSIGNMENTS:** Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding of 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.