 <b>MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI</b> <b>TEACHING AND EXAMINATION SCHEME</b>																	
<b>COURSE NAME : DIPLOMA IN TEXTILE TECHNOLOGY</b>																	
<b>COURSE CODE : TC</b>																	
<b>DURATION OF COURSE : SIX SEMESTERS</b>										<b>WITH EFFECT FROM : 2012-13</b>							
<b>SEMESTER : THIRD</b>										<b>DURATION : 16 WEEKS</b>							
<b>PATTERN : FULL TIME - SEMESTER</b>										<b>SCHEME : G</b>							
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17300)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Industrial Chemistry	ICH	17339	03	--	02	03	100	40	50@	20	--	--	--	--	<b>50</b>	
2	Organic Chemistry - II	OCH	17340	03	--	02	03	100	40	50@	20	--	--	--	--		
3	Chemistry of Synthetic Fibers	CSF	17341	03	--	02	03	100	40	--	--	--	--	25@	10		
4	Technology of Bleaching & Mercerisation	TBM	17342	03	--	04	03	100	40	--	--	25#	10	25@	10		
5	Chemistry of Dyes & Pigments	CDP	17343	03	--	--	03	100	40	--	--	--	--	--	--		
6	Professional Practices-I	PPT	17030	--	--	03	--	--	--	--	--	--	--	50@	20		
7	Textile Design & Colour	TDC	17031	01	--	02	--	--	--	--	--	--	--	25@	10		
<b>TOTAL</b>				<b>16</b>	<b>--</b>	<b>15</b>	<b>--</b>	<b>500</b>	<b>--</b>	<b>100</b>	<b>--</b>	<b>25</b>	<b>--</b>	<b>125</b>	<b>--</b>	<b>50</b>	
Student Contact Hours Per Week: <b>31 Hrs.</b> <b>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</b> Total Marks : <b>800</b> @ Internal Assessment, # External Assessment, Ø Common to TX, <span style="background-color: #cccccc; padding: 2px 10px;"> </span> No Theory Examination.																	
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Termwork, SW- Sessional Work.																	
<ul style="list-style-type: none"> <li>➤ Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subject are to be converted out of 100 marks as sessional work (SW).</li> <li>➤ Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.</li> <li>➤ Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.</li> </ul>																	

**Course Name : Diploma in Textile Technology**

**Course Code : TC**

**Semester : Third**

**Subject Title : Industrial Chemistry**

**Subject Code : 17339**

**Teaching & Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	50@	--	--	150

**Note:**

- **Two tests each of 25 marks to be conducted as per schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head sessional work.**

**Rationale:**

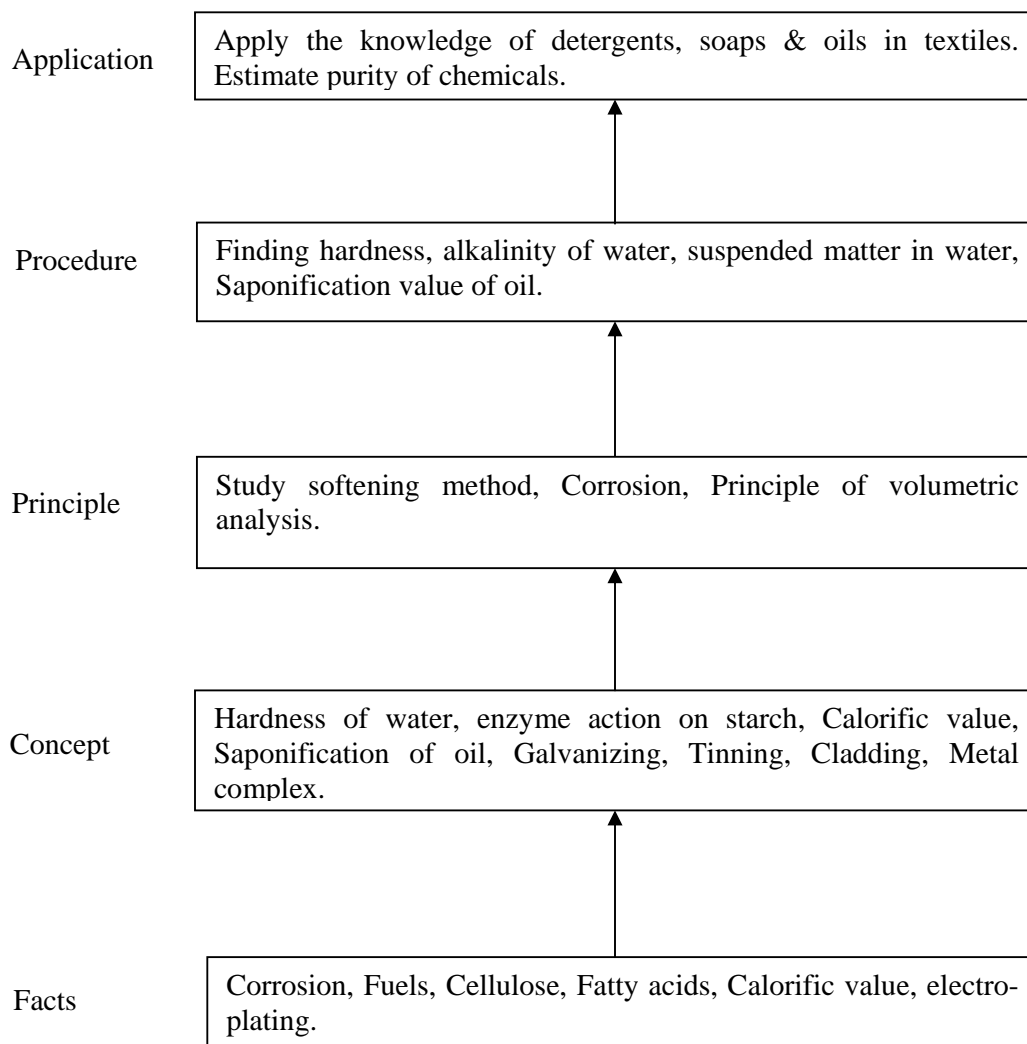
In wet processing, water is used in large quantity. Pure water gives best results. To reduce maintenance cost and increase the efficiency of machine the knowledge of corrosion is important. For cost efficiency and reduced pollution problems the understanding about fuel is required.

Carbohydrates, oils, soap and detergents are widely used in textile industry. The knowledge of some inorganic chemicals is of prime importance to study industrial chemistry.

**Objectives:**

The students will be able to:

- Check quality of water and use proper method of softening
- Take measures to avoid corrosion in industry.
- Use cost efficient fuels.
- Use proper quality and quantity of chemicals & auxiliaries in industry.

**Learning Structure:**

## Contents - Theory

Topic and Contents	Hours	Marks
<p><b>Topic 1: Water</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ List the water quality parameters.</li> <li>➤ Distinguish between permanent and temporary hardness.</li> <li>➤ Describe the method of water softening.</li> </ul> <p>Introduction, impurities in water and its effect on textile wet processing. Water quality parameters pH, alkalinity, Concept of dissolved oxygen, BOD, COD. Hardness of water: temporary, permanent, Units of hardness (ppm and mg/lit). Scale and sludge formation in boilers, priming and foaming. Softening methods: Ion exchangers and RO method. Removal of suspended impurities and micro-organisms.</p>	08	16
<p><b>Topic 2: Carbohydrates</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Identify the type of carbohydrates.</li> <li>➤ List the properties of starch paste.</li> </ul> <p><b>2.1</b> Introduction and classification of carbohydrates.</p> <p><b>2.2 Structure of Starch and its properties</b></p> <p>Chemical properties of starch paste – Congealing, Gelatinizing, Gelatinizing temperature, Viscosity, Keeping property. Action of enzymes on starch.</p> <p><b>2.3 Cellulose</b></p> <p>Structure of cellulose, chemical properties of cellulose – action of acid, alkali, oxidizing agent.</p>	06	12
<p><b>Topic 3: Oils, Soaps and Detergents</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Describe the method of determining saponification value of oil.</li> <li>➤ Predict the role of soap and detergents in textile wet processing.</li> </ul> <p><b>4.1</b> Introduction, Chemical nature of oils and fats, Some analytical methods: Saponification value.</p> <p>Chemical Properties: (i) Hydrogenation of oil, (ii) Hydrolysis of oils: water hydrolysis and alkali hydrolysis.</p> <p><b>4.2</b> Properties of soaps :(i) Soap solution as colloidal electrolyte, (ii) Surface Tension and Interfacial Tension Lowering, (iii) Foaming property, (iv) Wetting Property, (v) Suspending Power, and (vi) Detergent Property.</p>	07	14
<p><b>Topic 4: Fuels</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ List the types of fuels.</li> <li>➤ State the characteristic of good fuel.</li> </ul> <p>Definition, classification of fuel, Definition of calorific value and its units. Characteristic of fuel. Application in textile industry.</p>	03	08

<p><b>Topic 5: Corrosion</b>  <b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Distinguish between dry corrosion and wet corrosion.</li> <li>➤ List the factors affecting the rate of corrosion.</li> <li>➤ Predict the method of preventing corrosion.</li> </ul> <p>Definition, cause of corrosion, theories of corrosion, atmospheric and wet corrosion. Factors effecting rate of corrosion. Control of Corrosion by (i) Selection and Design (ii) Use of Alloys, (iii) Cathodic protection: Sacrificial Anode and External Current Method, iv) by Protective Coating: Galvanizing, Tinning, Metal Cladding, Electro Plating, Cementation, and Paints.</p>	08	16
<p><b>Topic 6: Testing of Chemicals</b>  <b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ List the methods of chemical analysis.</li> <li>➤ Describe volumetric methods of estimation.</li> </ul> <p>Analytical techniques for testing and analysis of textile chemicals. Qualitative and quantitative analysis, Volumetry: accuracy, precision, primary, and secondary standards, titration, and types of titration – acid base, complexometric, precipitation, redox titration.</p>	06	12
<p><b>Topic 7: Sequestering Agents and Co-ordinating Compounds</b>  <b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Identify co-ordinating compounds</li> <li>➤ List the factors affecting the stability of complex ions.</li> </ul> <p>Co-ordination compounds, Co-ordination number, Werner's Co-ordination theory, Factors affecting the stabilities of complex ions and co-ordination compounds, general types of complex ions, chelates, Uses of important sequestering agents in textiles.</p>	06	12
<p><b>Topic 8 : Chemistry of Important Compounds</b>  <b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ State the applications of chemicals used in textile industry.</li> <li>➤ List the properties of chemicals</li> </ul> <p>Chemical properties and uses of Sulphuric acid, Hydrochloric acid, Sodium hydroxide, Sodium carbonate. Application of these chemicals in textiles.</p>	04	10
<b>TOTAL</b>	<b>48</b>	<b>100</b>

**Intellectual Skills:**

- Identify the type of hardness of water.
- Identify the type of alkalinity of water sample.

**List of Experiments:**

1. Determination of total hardness of water.
2. Determination of alkalinity of water.
3. Determination of dissolved oxygen of given sample of water
4. Determination of total solids & suspended solids of given sample of water.
5. Determination of chemical oxygen demand of given sample of water.
6. Analysis of starch.
7. Determination of saponification value of oil.
8. Determination of rate of corrosion of given metal.
9. Determination of percent purity of given sodium hydroxide.

10. Determination of strength of given acid.
11. Estimation of sodium hydroxide and sodium carbonate in the mixture.

**Learning Resources:****Books:**

<b>Sr. No.</b>	<b>Author</b>	<b>Title</b>	<b>Edition</b>	<b>Year of Publication</b>	<b>Publisher</b>
1	Jain & Jain	Engineering Chemistry	13 <sup>th</sup>	2001	Danpatrai Publishing Co., 4787/23, Ansari Road, Daryaganj, New Delhi.
2	S. S. Dara	Text Book of Engineering Chemistry	7 <sup>th</sup>	1988	Sultan Chand & Sons Premier Book Co. 4792/23, Daryaganj, Delhi
3	P. L. Soni	Fundamental Inorganic Chemistry	4 <sup>th</sup>	1974	Sultan Chand & Sons Premier Book Co. 4792/23, Daryaganj, Delhi

**Course Name : Diploma in Textile Technology**

**Course Code : TC**

**Semester : Third**

**Subject Title : Organic Chemistry-II**

**Subject Code : 17340**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	50@	--	--	150

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

**Rationale:**

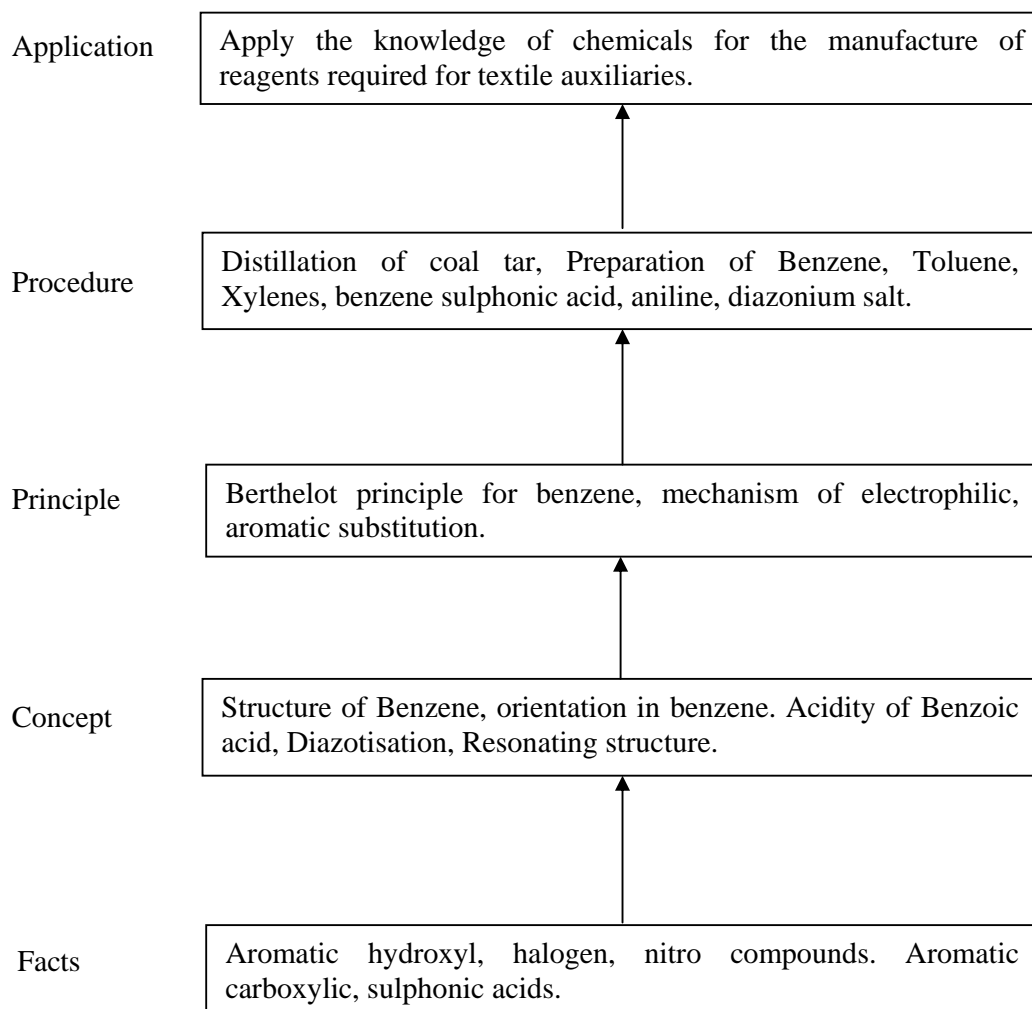
Organic chemistry is one of the subjects that provide the basic knowledge of the organic compounds, which are used in the all types of processes in chemical processing of textiles. The chemical technologist should possess this knowledge to anticipate the effects of the chemicals used during the processing not only to control the process but also to avoid the rework in the process. Synthetic dyes are based on organic chemistry and are used in the textile chemical processing very widely.

This subject is intended to impart necessary knowledge in this area.

**Objectives:**

The students will be able to:

- Understand the fundamentals of dyestuffs.
- Understand the fundamentals of auxiliaries.
- Conceive ideas regarding the role of organic chemicals in textile wet processing.
- Understand the use of organic chemicals in laboratories.

**Learning Structure:**



## Contents: Theory

Topic and Contents	Hours	Marks
<p><b>Topic 1: Aromatic Hydrocarbons</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ State the characteristics of Aromatic compounds.</li> <li>➤ Distinguish between Aliphatic and Aromatic compounds</li> <li>➤ Describe the method of extraction of Aromatic hydrocarbons</li> </ul> <ul style="list-style-type: none"> <li>• Distinguish between Aliphatic and Aromatic compounds, Coal tar distillation, Nomenclature of Aromatic hydrocarbons,</li> <li>• Methods of preparation of benzene. Physical &amp; chemical properties of benzene. Uses of benzene.</li> <li>• Methods of preparation of Toluene Physical &amp; chemical properties of Toluene</li> </ul>	05	16
<p><b>Topic 2: Aromatic Halogen Compounds</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Predict the method of preparing Chlorobenzene</li> <li>➤ State the applications of Chlorobenzene</li> </ul> <p>Nomenclature, Methods of preparation of Chlorobenzene by (i) direct halogenation, (ii) Action of <math>PCl_5</math> on nuclear hydroxyl compounds (iii) Sandmeyer's Reaction</p> <p>Physical properties, chemical properties and uses of Chlorobenzene.</p>	03	06
<p><b>Topic 3: Aromatic Sulphonic Acids</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ State the method of preparing benzene sulphonic acid</li> </ul> <p>Nomenclature, Preparation of benzene sulphonic acid. Physical properties, Chemical properties &amp; uses of benzene sulphonic acid.</p>	04	08
<p><b>Topic 4: Aromatic Nitro Compounds</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Identify the reagents required for preparation of nitrobenzene</li> <li>➤ State the chemical properties of nitrobenzene</li> </ul> <p>Nomenclature, Preparation of nitrobenzene. Physical properties &amp; chemical properties of nitrobenzene. Reduction of nitrobenzene in acidic, alkaline &amp; neutral medium. Uses of nitrobenzene</p>	03	06
<p><b>Topic 5: Aromatic Amino Compounds</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ State the chemical properties of Aniline.</li> </ul> <p>Nomenclature, Preparation of Aniline. Physical properties, Chemical properties &amp; uses of Aniline.</p>	05	10
<p><b>Topic 6: Diazonium Salts</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ State the application of Diazotization in textiles.</li> </ul> <p>Nomenclature, Diazotization, Preparation of benzene Diazonium chloride. Physical, chemical properties &amp; uses of benzene diazonium chloride.</p>	05	10

<p><b>Topic 7: Aromatic Hydroxy Compounds</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ List the chemical properties of Phenols.</li> <li>➤ Identify the role of Phenol in preparation of intermediates.</li> </ul> <p>Nomenclature, Preparation of Phenol. Physical properties, chemical properties &amp; uses of phenol. Applications in preparation of dye intermediate.</p>	05	12
<p><b>Topic 8 : Aromatic Acids</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ List the properties of Benzoic acid.</li> <li>➤ Identify the role of Aromatic acid in preparation of intermediates.</li> </ul> <p>Nomenclature, Preparation of Benzoic acid. Physical properties, chemical properties &amp; uses of Benzoic acid.</p>	05	10
<p><b>Topic 9 : Chemistry of Fused Ring Aromatic Hydrocarbon</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Draw the resonating structures of naphthalene.</li> <li>➤ Identify the role of fused ring compounds in preparation of intermediates.</li> <li>➤ State the application of substituted aromatic hydrocarbon in dye manufacturing.</li> </ul> <p><b>9.1 Fused Rings and Resonating Structures</b> Meaning of the term fused ring, Resonating structure of naphthalene,</p> <p><b>9.2 Naphthalene</b> Preparation of Naphthalene - Coal tar distillation. Physical properties of Naphthalene and Anthracene. Chemical properties of Naphthalene, Sulphonation, Nitration, Halogenation, Hydroxylation.</p> <p><b>9.3 Anthracene</b> Preparation of Anthracene Physical properties of Anthracene. Chemical properties of Anthracene.</p> <p><b>9.4 evidences of fused rings in preparation of dye intermediates</b></p>	13	22
<b>Total</b>	<b>48</b>	<b>100</b>

**Intellectual Skills:**

- 1) Understanding of qualitative analysis.
- 2) Understanding of quantitative analysis.
- 3) Understanding preparation of dyestuffs.
- 4) Understand the use of organic chemicals in laboratories.

**List of Experiments:****Study of Preparations:**

1. Preparation of Benzoic acid.
2. Preparation of benzene azo-beta naphthol dyestuff.
3. Preparation of anhydride derivative of dicarboxylic acid.

**Study of Organic Estimations:**

4. Estimation of Glucose.
5. Estimation of Ester.
6. Estimation of Resist salt.

7. Estimation of Ethylene glycol.

**Organic Spotting:**

8. Identification of Acidic organic compounds.
9. Identification of Basic organic compounds.
10. Identification of Phenolic organic compounds.
11. Identification of Neutral organic compounds- I.
12. Identification of Neutral organic compounds- II.
13. Demo: Determination of solvent soluble matter in cotton fabric sample by using soxhlet apparatus.

**Learning Resources:**

**Books:**

Sr. No	Author	Title	Edition	Year of Publication	Address of Publisher
1	P. L. Soni H. M. Chawla	Text Book of Organic Chemistry	27 <sup>th</sup>	1997	Sultan Chand & Sons Premier Book Co., 4792/23, Dariyaganj, Dehli
2	Arun Bahl, B. S. Bahl	Text Book of Organic Chemistry	15 <sup>th</sup>	1999	Sultan Chand & Sons Premier Book Co. 4792/23, Dariyaganj, Dehli
3	R. T. Morrison, R. N. Boyd	Text Book of Organic Chemistry	--	--	Allyn & Bacon Inc., Boston
4	R. K. Bansal	Organic Chemistry	3 <sup>rd</sup>	--	New Age International (P) Ltd., New Delhi
5	G. L. Patric	Instant Notes Organic Chemistry	--	--	Viva Books Pvt. Ltd., New Delhi.

**Course Name : Diploma in Textile Technology**

**Course Code : TC**

**Semester : Third**

**Subject Title : Chemistry of Synthetic Fibers**

**Subject Code : 17341**

**Teaching & Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	02	03	100	--	--	25@	125

**NOTE:**

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

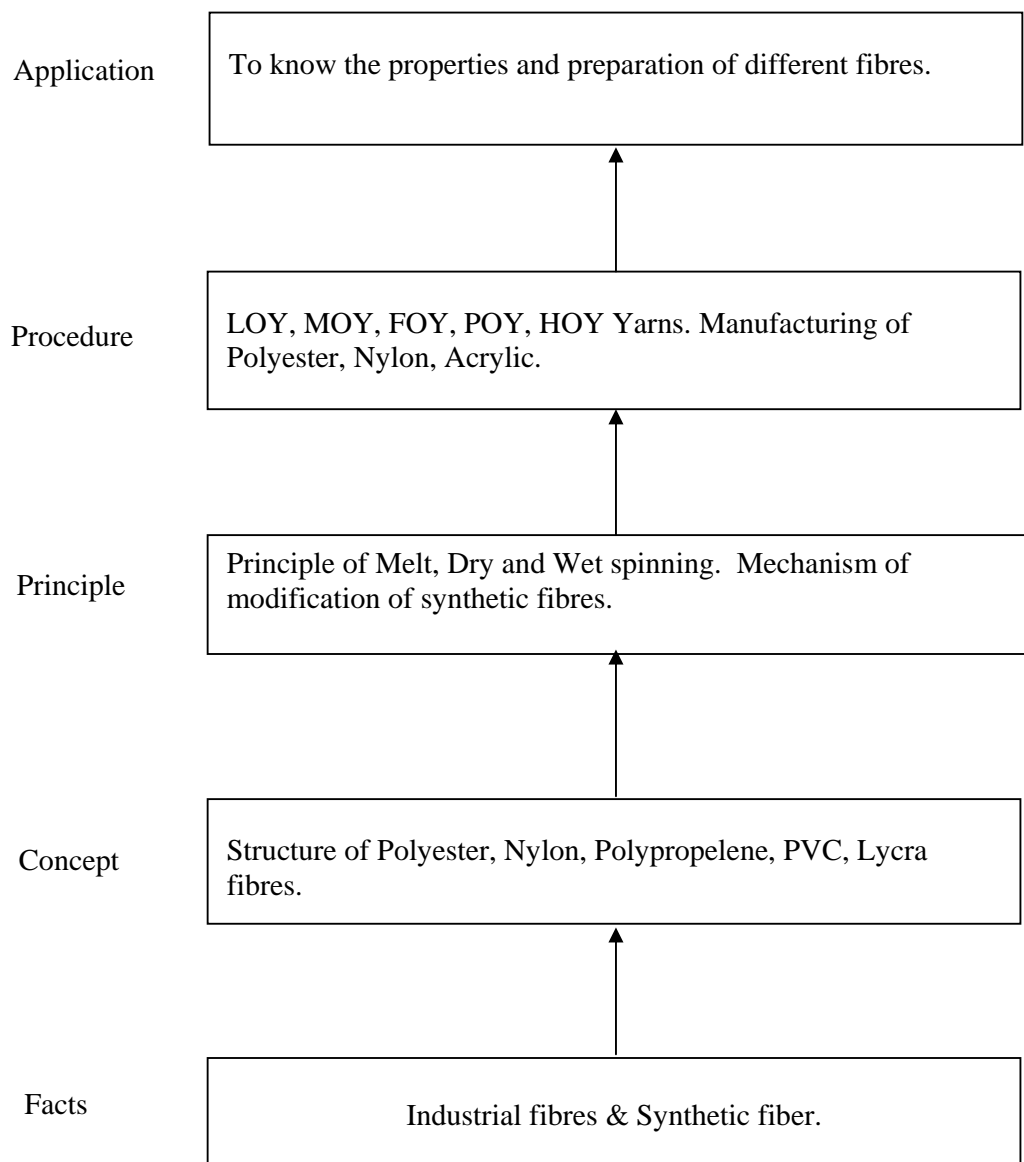
**Rationale:**

Chemical processing of textiles is an art of improving the overall value of various fibrous materials. These textile fibres can be synthetic fibres too. In recent days the use of such fibres has increased tremendously due to their excellent properties. The processing technologist must have the adequate knowledge of these synthetic fibres, as there are special methods to treat them.

**Objectives:**

The students will be able to:

- Get the knowledge of manufacturing processes and properties of Synthetic fibres.
- Study unconventional fibres and their industrial application.

**LEARNING STRUCTURE:**

Chapter		Hours	Marks
01	<p><b>Fundamentals of Fibre Spinning:</b>  <b>Specific Objective :</b>            Students will be able to            Identify different spinning processes based on their features            Understand principles of melt spinning.            1.1 General principles of the spinning process            1.2 Concept of Melt spinning ,General features and essential requirements of melt spinning,            1.3 Theory of solidification of polymer in melt spinning techniques,            1.4 Formation of fibre structure during spinning,            1.5 Total sequence of polymer flow in melt spinning, Melt spinning equipment - melting devices, static device, filters, manifold, spin-pack, quenching zone. Take-up winders,            1.6 Concept of high speed spinning, Direct melt spinning,            1.7 Concept of LOY, MOY, POY, HOY, FOY yarns.</p>	12	24
02	<p><b>Polyester Fibres:</b>  <b>Specific Objective:</b>            Students will be able to            Identify the fibers based on manufacturing process            List physical , chemical properties and uses of fibre            Identify the fiber based on its characteristics            2.1 Raw materials, synthesis, Manufacturing process of Polyester            2.2 Physical, chemical properties and uses of Polyester,            2.3 Manufacturing process, properties and application of Polyester micro fibres,            2.4 Modified polyester fibres like Hollow fibre, hydrophilic fibre, low pilling, Flame retardant fibre, CDPET.</p>	12	20
03	<p><b>Polyamide Fibres</b>  <b>Specific Objective:</b>            Students will be able to            Identify the fibers based on manufacturing process            List physical, chemical properties and uses of fibre            Identify the fiber based on its characteristics            3.1 Raw materials, synthesis and manufacturing process of Nylon-6 and Nylon-66,            3.2 Physical, chemical properties of Nylon-6 &amp; Nylon-66, uses of Nylon.            3.3 Modified nylon fibres like hydrophilic, antistatic, low pilling, Flame retardant, differentially dyeable nylon</p>	08	20
04	<p><b>Acrylic Fibres</b>  <b>Specific Objective :</b>            Students will be able to            Identify the fibers based on manufacturing process            List physical , chemical properties and uses of fibre            Identify the fiber based on its characteristics            4.1 Raw materials synthesis, manufacturing process of acrylic &amp; Modacrylic,            4.2 Physical and chemical properties of Acrylic and Modacrylic, uses of Acrylic &amp; Modacrylic,</p>	08	16

	4.3 Modified acrylic fibres like hydrophilic fibre, low pilling, flame retardant, bicomponent fibres.		
05	<b>Industrial Fibers</b> <b>Specific Objective :</b> Students will be able to Identify the fibers based on manufacturing process List the uses of industrial fibers Manufacturing process, Physical, Chemical properties and uses of Polyethylene fibres, Polypropylene fibres, Glass fibres and Carbon fibres, Lycra fibres	08	20
<b>Total</b>		<b>48</b>	<b>100</b>

**Practical:****Skills to be developed;****Intellectual Skills:**

1. Identify fibres by different methods.
2. Analyzing accessible region & damage of fibre.
3. Analyses of blend.

**Motor Skill:**

1. Microscopic or chemical method of analysis.
2. Idometric titration, oxy & hydro cellulose detection.
3. Chemical dissolution method for blend.

**List of Practicals:**

1. Identification of fibres by microscopic method.
2. Identification of fibres by chemical methods - I
3. Identification of fibres by chemical methods - II
4. Identification of fibres from binary blends by chemical methods - I
5. Identification of fibres from binary blends by chemical methods - II
6. Identification of fibres from tertiary blends by chemical methods
7. Determination of accessible region of cotton
8. Determination of accessible region of PET by iodine absorption method
9. Quantitative analysis of blend - I
10. Quantitative analysis of blend - II
11. Detection of oxy – cellulose & Hydro cellulose

**Learning Resources:****Books:**

<b>Sr. No.</b>	<b>Author</b>	<b>Title</b>	<b>Edition</b>	<b>Year of Publication</b>	<b>Publisher</b>
1	V. C. Gupta, V. K. Kothari	Manufactured Fibre Technology	1 <sup>st</sup>	1997	Chapmang Hall
2.	S. K. Mukhop- adhyay	Advances in Fibre Science	2 <sup>nd</sup>	1992	Cadio back The Text. Inst.
3.	A. A. Vaidya	Production of synthetic fibres	1st	1988	Prentice Hall of India
4.	Jordon Cook	Synthetic Fibres	5th	2005	Woodhead Publications



**Course Name : Diploma in Textile Technology**

**Course Code : TC**

**Semester : Third**

**Subject Title : Technology of Bleaching & Mercerisation**

**Subject Code : 17342**

**Teaching & Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	04	03	100	--	25#	25@	150

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

**Rationale:**

The students should have knowledge of the chemical behaviour of the ingredients used in the sizing process. This subject intends to impart the knowledge of the properties, uses and testing of sizing ingredients.

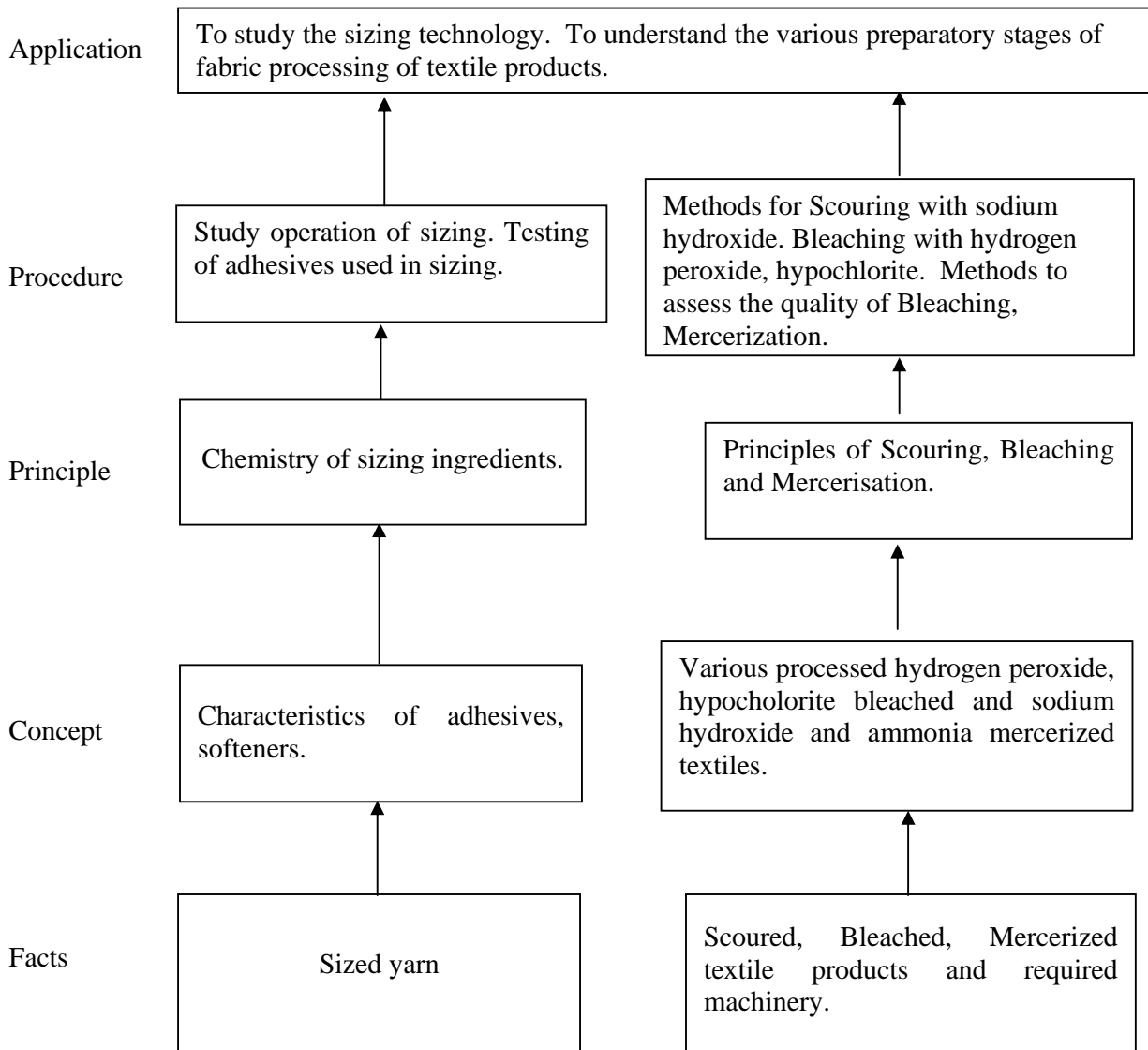
The chemical processing of the textiles is divided in to number of different stages like Scouring, Bleaching, Dyeing, Printing and Finishing. At every stage the fabric is either prepared for subsequent stage or it is given the final form so that it can be put to the intended use. Bleaching is important stage in the sequence. This subject intends to give chemical and technological knowledge and skills of the chemical processing of textiles.

**Objectives:**

The students will be able to:

- Get the knowledge of various sizing ingredients and their role in sizing process.
- Know the various pretreatments given to different textile substrates and their importance in textile wet processing.
- Study the check points and testing procedures at various levels in pretreatments.

**Learning Structure:**



**Contents: Theory**

Chapter	Name of the Topic	Hours	Marks
01	<p><b>Topic 1: Sizing</b>  <b>Specific objectives:</b>            Students will be able to understand</p> <ul style="list-style-type: none"> <li>➤ Objects of sizing, role of sizing ingredients.</li> <li>➤ Testing procedure of adhesives &amp; softeners.</li> </ul> <p>Contents :</p> <p>1.1 Objects of Sizing, sizing ingredients and their functions,            1.2 Classification of adhesives, Adhesives for Cotton, Polyester, Acrylic and Nylon yarn/ filaments.            1.3 Keeping and congealing property of starches and their significance.            1.4 Softeners in sizing,            1.5 Testing of starches and softeners.            1.6 Size paste formulation for Cotton, P/C, P/V yarn.</p>	08	10
02	<p><b>Topic 2: Mechanical Preparation of fabrics</b>  <b>Specific objectives:</b>            Students will be able to understand</p> <ul style="list-style-type: none"> <li>➤ Preparatory process sequence for various textile substrates.</li> <li>➤ Importance of Grey Inspection, Shearing &amp; Cropping and Singeing Process.</li> <li>➤ Working of Gas Singeing Machine.</li> </ul> <p>Contents :</p> <p>2.1 Introduction &amp; importance of pretreatments,            - General Pretreatment sequences for yarn, woven fabrics, knitted fabrics, synthetics &amp; their blends.            2.2 Grey Inspection            - Importance of grey inspection,            - Types of faults in grey fabric,            - Four point &amp; Ten point system of fabric inspection, criteria for rejection            - Importance of stitching,            - Fabric Inspection machines.            2.3 Shearing and Cropping            - Objects,            - 2 cutter and 4 cutter shearing &amp; cropping machine.            2.4 Singeing            - Objects of Singeing,            - Types of Singeing, Comparison of Plate, Roller and Gas Singeing machines.            - Construction &amp; working principle of Gas Singeing Machine,            - Singeing of yarn, Woven Fabric, Knitted Fabric, Synthetic Fabrics &amp; Their Blends.</p>	08	16

03	<p><b>Topic 3 : Desizing</b>  <b>Specific objectives:</b>  Students will be able to understand</p> <ul style="list-style-type: none"> <li>➤ Identification of size on grey fabric.</li> <li>➤ Mechanism &amp; procedure of desizing, evaluating desizing efficiency.</li> <li>➤ M/C used for desizing.</li> </ul> <p>Contents :</p> <p>3.1 Identification of size in grey fabric,  3.2 Objects, mechanism of desizing.  3.3 Types of desizing, enzyme desizing, factors affecting action of enzymes,  3.4 Batch wise &amp; continuous method of desizing.  3.5 Evaluation of the efficiency of desizing.</p>	04	12
04	<p><b>Topic 4 : Scouring</b>  <b>Specific objectives:</b>  Students will be able to understand</p> <ul style="list-style-type: none"> <li>➤ Objects and mechanism and types of scouring.</li> <li>➤ Recipes used for scouring of different textile goods and evaluating scoring efficiency.</li> <li>➤ Working of scouring machines.</li> </ul> <p>Contents :</p> <p>4.1 Objects,  - Mechanism of scouring  - Reactions involved in scouring,  4.2 Concept of alkaline scouring, solvent scouring, bio-scouring.  4.3 Scouring of cotton, synthetics and their blends.  4.4 Scouring of knit goods.  4.5 Coloured woven goods.  4.6 Batchwise, semi continuous &amp; continuous methods of scouring.  4.7 Construction &amp; working principle of kier, J-box, Jigger &amp; soft flow machine.  4.8 Evaluation of the efficiency of scouring.</p>	06	16
05	<p><b>Topic 5: Bleaching</b>  <b>Specific objectives:</b>  Students will be able to understand</p> <ul style="list-style-type: none"> <li>➤ Object, mechanism of bleaching.</li> <li>➤ Recipes used and different parameters in peroxide bleaching and evaluation of bleaching efficiency.</li> <li>➤ Working of bleaching machine.</li> </ul> <p>Contents:</p> <p>5.1 Objects,  5.2 Types of bleaching agent,  5.3 Mechanism of H<sub>2</sub> O<sub>2</sub> &amp; NaOCl bleaching,  - Factors affecting H<sub>2</sub> O<sub>2</sub> bleaching,  - Role of stabilizer, activator in H<sub>2</sub> O<sub>2</sub> bleaching,  - Comparison between H<sub>2</sub> O<sub>2</sub> &amp; NaOCl bleaching.  5.4 Bleaching of Cotton, Polyester and their blends with H<sub>2</sub> O<sub>2</sub>.  - Bleaching of knits,  - Bleaching of coloured woven goods  5.5 Batch wise, semi continuous &amp; continuous methods of bleaching.</p>	08	16

	5.6 Evaluation of the efficiency of bleaching. 5.7 Outline of developments in bleaching with respect to energy consumption.		
06	<p><b>Topic 6: Mercerization</b> <b>Specific objectives:</b> Students will be able to understand</p> <ul style="list-style-type: none"> <li>➤ Objects of mercerization, parameters affecting mercerization.</li> <li>➤ Machines used for mercerization and evaluation of mercerization efficiency.</li> </ul> <p>Contents :</p> <p>6.1 Objects, 6.2 Various changes brought about by mercerization, 6.3 Concept of cellulose conversion during mercerization, - Concept of causticization, 6.4 Factors affecting the mercerization process. 6.5 Yarn mercerization, 6.6 Machines used for woven and knitted fabric. 6.7 Concept of hot mercerization and liquid ammonia mercerization. 6.8 Evaluation of the efficiency of mercerization by Barium Activity Number,</p>	10	20
07	<p><b>Topic 7: Preparation of Wool and Silk</b> <b>Specific objectives:</b> Students will be able to understand</p> <ul style="list-style-type: none"> <li>➤ Method for Preparation of Silk and Wool.</li> <li>➤ Degumming process of Silk</li> </ul> <p>Contents :</p> <p>7.1 Preparatory process sequence for woollen and worsted goods. 7.2 Scouring of wool in top &amp; fabric form, 7.3 Outline of carbonization, crabbing and milling of wool, 7.4 Preparatory process sequence for silk goods. 7.5 Degumming of silk, - Objects, - Degumming with soap, alkali and enzyme.</p>	04	10
<b>TOTAL</b>		<b>48</b>	<b>100</b>

**Practical:****Skills to be developed:****Intellectual Skills:**

1. Learn desizing, scouring & bleaching method.
2. Identify mercerized goods.
3. Understanding mercerization process.

**Motor Skill:**

1. Acid desizing, open scouring, peroxide bleach of cellulosic material.
2. Correlating mercerization efficiency with BAN.

**List of Practical:**

1. Desizing of cotton with acid and enzyme with their comparison.
2. Scouring of cotton yarn / fabric using open kier method.
3. Scouring of cotton yarn / fabric using closed kier method.
4. Scouring of coloured woven / knitted goods
5. Bio scouring of knit goods.
6. Scouring of polyester and its blend.
7. Bleaching of cotton using hypochlorite and hydrogen peroxide with their comparison.
8. Combined scouring and bleaching of cotton yarn.
9. Bleaching of polyester and its blends.
10. Degumming of silk.
11. Bleaching of wool and silk
12. Causticization of terry towel.
13. Determination of BAN of mercerized goods.
14. Visit to conventional and modern process houses.

**Learning Resources:****Books:**

Sr. No.	Author	Title	Edition	Year of Publication	Publisher
1	D.B. Ajgaonkar, M. K. Talukdar, V. R. Wadekar	Sizing	1 <sup>st</sup>	1982	Textile trade press Ahmedabad.
2.	R.M. Mittal, S. S. Trivedi	Chemical Processing of Polyester / Cellulosic blends	2 <sup>nd</sup>	1983	ATRIA., Ahmedabad
3.	V. A. Shenai	Technology of Bleaching and Mercerising	--	1996	Sevak Publication, Mumbai.
4	S. R. Karmakar	Preparatory processes for textiles	--		John Wiley Sons.

**Course Name : Diploma in Textile Technology**

**Course Code : TC**

**Semester : Third**

**Subject Title : Chemistry of Dyes and Pigment**

**Subject Code : 17343**

### Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	--	03	100	--	--	--	100

#### NOTE:

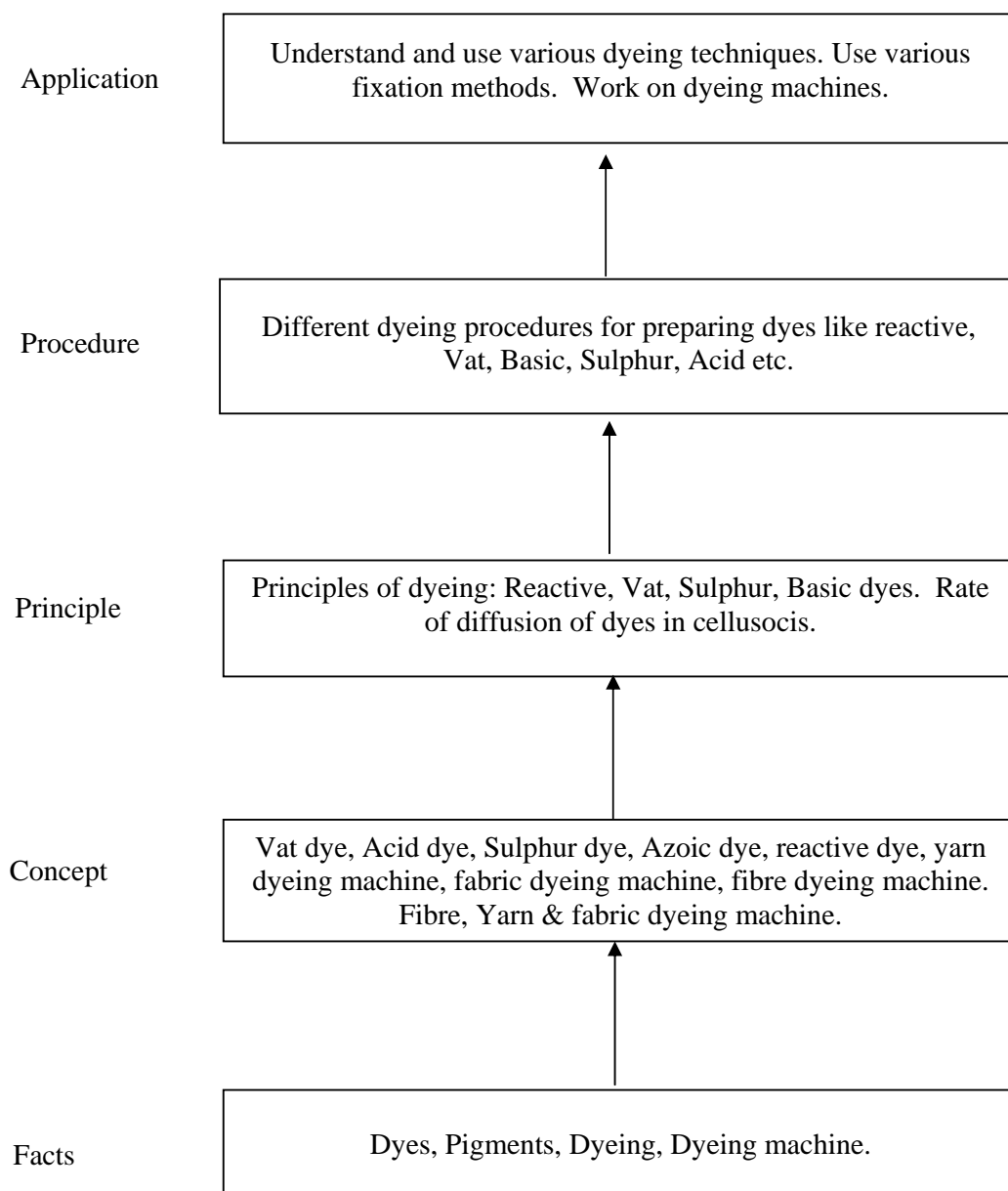
- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 100 and to be entered in mark sheet under the head Sessional Work (SW).

#### Rationale:

Dyeing and Printing are the colouration processes carried out to the textile fibres. Dyes and Pigments are of different chemical structures. The processing technologist must have the adequate knowledge of these steps to know the theory behind the colouration process.

#### General Objectives:

- Get in-depth knowledge of dye industry.
- Know chemical structures, properties of dyes and pigment.
- Study various reaction mechanisms involved in the manufacturing of dyes and pigments.

**Learning Structure:**



**Theory:**

Topic and Contents	Hours	Marks
<p><b>Topic 1: Introduction to Dye</b></p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> <li>• Distinguish between colour and dye</li> <li>• Describe the mechanism of dyeing</li> </ul> <p>Contents:</p> <p>1.1 <span style="float: right;"><b>12 Marks</b></span></p> <ul style="list-style-type: none"> <li>• Difference between dye and colour, need for preparation of synthetic dyes, introduction to synthetic dye industry</li> <li>• Destructive distillation of coal tar and use of the byproducts obtained during this process in dyestuff manufacturing</li> <li>• Importance of intermediates in dyestuff industry</li> </ul> <p>1.2 <span style="float: right;"><b>04 Marks</b></span></p> <ul style="list-style-type: none"> <li>• Mechanism of dyeing – adsorption, diffusion and dye fixation.</li> </ul>	08	16
<p><b>Topics 2: Aspects of Chemical Structure of Dyestuff</b></p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> <li>• Identify the chromospheres, auxochromes and their role.</li> <li>• State relationship between chemical structure and properties of dyes.</li> </ul> <p>Contents: <span style="float: right;"><b>16 Marks</b></span></p> <p>2.1</p> <ul style="list-style-type: none"> <li>• Electromagnetic radiation, visible spectrum,</li> <li>• Visible light – details of wavelength range, colour, additive and subtractive colour mixing, colour mixing – definition of hue value and chroma</li> <li>• Interaction of radiation with matter ie. Absorption, reflection, transmission</li> <li>• Witts chromophore, auxochrome theory- definition of chromophore, types of chromophores, definition of auxochrome, types of auxochromes, bathochromic and hypsochromic shift.</li> <li>• Modern theory of colour and chemical constitution.</li> </ul> <p>2.2 <span style="float: right;"><b>10 Marks</b></span></p> <ul style="list-style-type: none"> <li>• Factors governing absorption of light.</li> <li>• Relation between chemical structure and fastness properties of dye.</li> <li>• Relation between chemical structure and substantivity of dye.</li> </ul>	12	26

<b>Topics 3: Classification of Dyes and Pigments</b> Specific Objectives: <ul style="list-style-type: none"> <li>Identify the class of dye</li> <li>Distinguish between colour and dye</li> </ul> Contents: <p>3.1 <b>10 Marks</b></p> <ul style="list-style-type: none"> <li>Definition of dye</li> <li>Classification of dye based on - method of application and chemical structure</li> </ul> <p>3.2 <b>06 Marks</b></p> <ul style="list-style-type: none"> <li>Colour index and its significance</li> <li>Nomenclature of dyes</li> </ul> <p>3.3 <b>08 Marks</b></p> Pigments <ul style="list-style-type: none"> <li>Distinguish between dyes and pigments</li> <li>Definition of pigment, classification of pigments.</li> </ul>		12	24
<b>Topics 4: Preparation of Intermediates</b> Specific Objectives: <ul style="list-style-type: none"> <li>Identify the methods of preparing dye intermediates</li> <li>Distinguish between structures of intermediates</li> </ul> Contents:           Preparation of the following intermediates 1) H- acid, J- acid, gamma – acid, naphthionic acid, peri acid, sulphanilic acid, metanilic acid		04	12
<b>Topic 5: Preparation of dyes from intermediates</b> Specific Objectives: <ul style="list-style-type: none"> <li>Identify the methods of preparing dyes.</li> <li>Select the intermediates required for preparation of dyes</li> </ul> Contents: <p>5.1 preparation of following dyes <b>12 Marks</b></p> Nitro dyes Azo dyes Anthraquinone dyes- yellow, blue green and red V at dyes DPM and TPM dyes. <p>5.2 Reactive dyes <b>10 Marks</b></p> Preparation of Cold brand reactive dye, Hot brand reactive dye, HE brand and ME brand reactive dyes		12	22
<b>Total</b>		<b>48</b>	<b>100</b>

**Learning Resources:****Books:**

Sr. No.	Author	Title	Publisher
1	G. R. Chatwal	Synthetic Organic Chemistry	Himalaya House Publication
2	K. Venkatraman	Synthetic Dyes	Academic Publication Inc.
3	V. A. Shenai	Chemistry of Dyes & Principles of Dyeing	Sevak Publication, Mumbai
4	Paul Vittum	Principles of Dye Chemistry	Inter Science Pub. Inc.
5	K. M. Shah	Synthetic Dyes	Malti Tech Publication.

**Course Name : Diploma in Textile Manufacture and Diploma in Textile Technology**

**Course Code : TX/TC**

**Semester : Third**

**Subject Title : Professional Practices-I**

**Subject Code : 17030**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
--	--	03	--	--	--	--	50@	50

**Rationale:**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

**Objectives:**

Student will be able to:

1. Acquire information from different sources.
2. Prepare notes for given topic.
3. Present given topic in a seminar.
4. Interact with peers to share thoughts.
5. Prepare a report on industrial visit, expert lecture.

Serial No.	Activities
1	<p><b>Industrial Visits</b> Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. <b>TWO</b> industrial visits may be arranged in the following areas / industries :</p> <ul style="list-style-type: none"> <li>i) The Spinning Mill</li> <li>ii) The weaving mill</li> <li>iii) Composite Mill</li> <li>iv) Garment Manufacturing unit</li> <li>v) Processing unit</li> </ul>
2	<p>Lectures by Professional / Industrial Expert be organized from <b>ANY THREE</b> of the following areas:</p> <ul style="list-style-type: none"> <li>i) Use of Technical Textiles</li> <li>ii) Modern Spinning machines</li> <li>iii) Modern weaving unit( Shuttle less weaving )</li> <li>iv) Selection of electric motors.</li> <li>v) Computer aided designing</li> <li>vi) Industrial hygiene.</li> <li>vii) Composite Materials from Textile</li> <li>viii) Safety Engineering and Waste elimination in Textile industry</li> </ul>
3	<p><b>Individual Assignments:</b></p> <p><b>1. Any two</b> from the list suggested</p> <ul style="list-style-type: none"> <li>a) Latest development in Blow room</li> <li>b) Latest development in Carding</li> <li>c) Latest development in Draw frame</li> <li>d) Latest development in Speed frame</li> <li>e) Latest development in weaving machines</li> <li>f) Selection of fabric for a Garment</li> <li>g) List the various properties and applications of following Fibers – cotton Polyester OR, Viscose etc. for non woven Applications</li> </ul> <p><b>2. Conduct ANY ONE</b> of the following activities through active participation of students and write report</p> <ul style="list-style-type: none"> <li>h) Rally for energy conservation / tree plantation.</li> <li>ii) Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc.</li> <li>iii) Conduct aptitude , general knowledge test , IQ test</li> <li>iv) Arrange <b>any one</b> training in the following areas : <ul style="list-style-type: none"> <li>a) Yoga. B) Use of fire fighting equipment and First aid</li> <li>b) Maintenance of Domestic appliances.</li> </ul> </li> </ul>

**Course Name : Diploma in Textile Technology**

**Course Code : TC**

**Semester : Third**

**Subject Title : Textile Design and Colour**

**Subject Code : 17031**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
01	--	02	--	--	--	--	25@	25

**Rationale:**

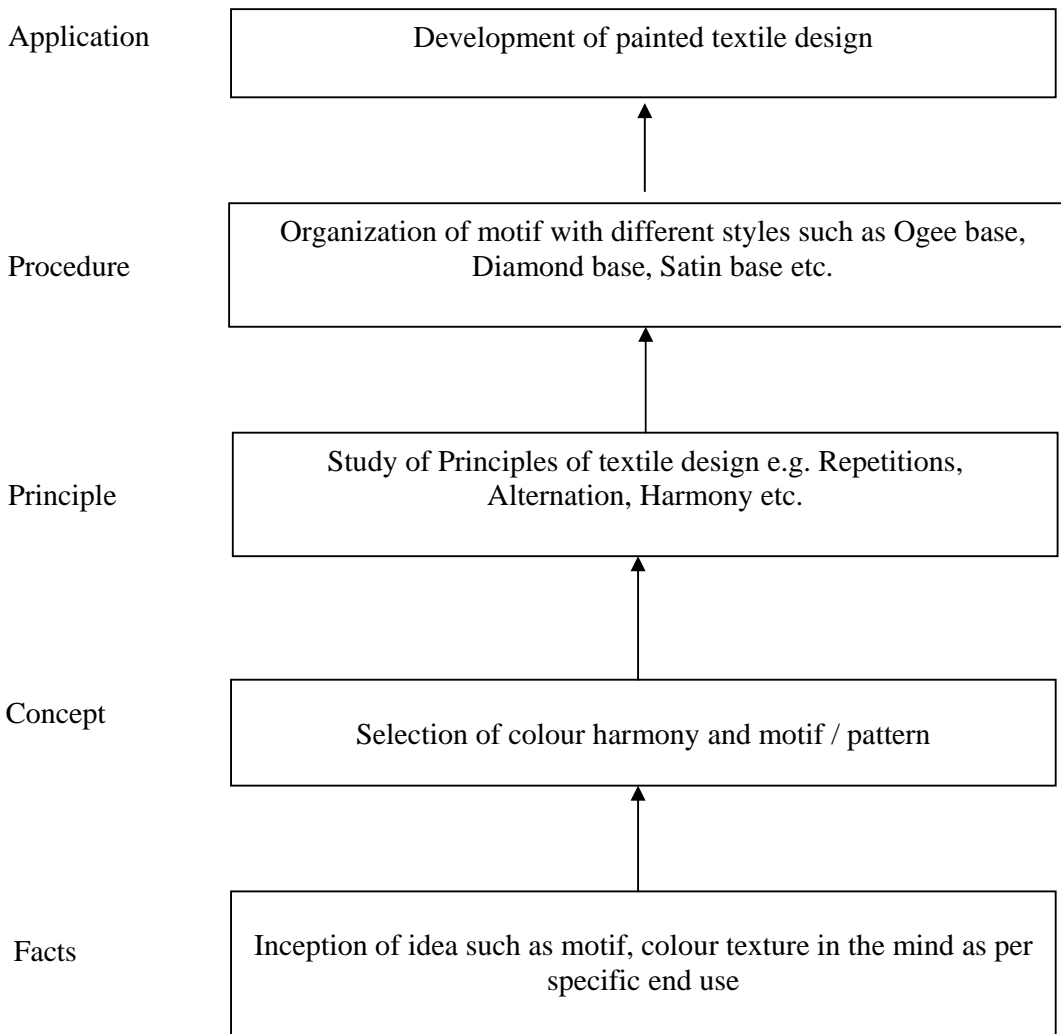
The field of fabric decoration, now commonly known as surface design, has seen a great deal of growth and development. In this subject prime concern is to study the relationship between design and fabric surface. The student will study elements of art, principles of textile design which are the basic concepts. They will apply this concept during textile design development with the help of creativity.

**Objectives:**

The students will be able to:

1. Understand different elements of art and develop art work.
2. Appreciate the principles of textile design and apply the same during development of textile design.
3. Know about colour & its role in art work.
4. Understand theories of colour and apply the same during design development.
5. Study different colour harmonies.

**Learning Structure:**



**Contents:**

<b>Chapter</b>	<b>Contents</b>
1	<p><b>Elements of Art :</b>  <b>Specific Objectives: Student will be able to understand</b></p> <ul style="list-style-type: none"> <li>➤ Identify elements of art</li> <li>➤ Draw art work</li> </ul> <p><b>Contents:</b></p> <p>a) Line:- Definition, Concept, attributes &amp; types of line  b) Direction:- Definition, Concept, attributes&amp; types of direction  c) Shape:- Definition, Concept, attributes&amp; types of shape  d) Size:- Definition, Concept, attributes&amp; types of size  e) Texture:- Definition, Concept, attributes&amp; types of texture  f) Value:- Definition, Concept, attributes  g) Colour:- Definition, Types of colour</p>
2	<p><b>Principles of Textile Design :</b>  <b>Specific Objectives: Student will be able to understand</b></p> <ul style="list-style-type: none"> <li>➤ Use principles of design during design development process</li> <li>➤ Compare principle of designs</li> </ul> <p><b>Contents :</b></p> <p>a) Repetition:- Concept of repetition principle  Technical repetition  Formal repetition  Informal repetition</p> <p>b) Alternation:- Concept of alternation principle  Colour alternation  Size alternation  Direction alternation  Shape alternation  Permutation &amp; combination of above</p> <p>c) Harmony:- Concept &amp; attribute  Pure harmony  Discord harmony</p> <p>d) Gradation:- Concept of gradation</p> <p>e) Contrast :- Concept of contrast  Concept of hue  Concept of tone</p> <p>f) Balance :- Concept of balance  Formal balance  Informal balance</p> <p>g) Dominance :- Concept of dominance principle</p>
3	<p><b>Theories of Colours:</b>  <b>Specific Objectives: Student will be able to understand</b></p> <ul style="list-style-type: none"> <li>➤ Draw charts of theories of colour</li> <li>➤ Distinguish pigment and light theory of colour</li> </ul> <p><b>Contents :</b></p> <ul style="list-style-type: none"> <li>• Pigment theory of colour (Subtractive theory of colour)</li> <li>• Light theory of colour (Additive theory of colour)</li> </ul>
4	<p><b>Colour Modification :-</b>  <b>Specific Objectives: Student will be able to understand</b></p> <ul style="list-style-type: none"> <li>➤ Develop tints of given colour</li> <li>➤ Develop tones of given colour</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Develop shades of given colour</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Development of tints</li> <li>• Development of tones</li> <li>• Development of shades</li> </ul>
5	<p><b>Colour Harmonies :</b></p> <p><b>Specific Objectives: Student will be able to</b></p> <ul style="list-style-type: none"> <li>➤ Develop designs with achromatic, monochromatic, analogous, complementary and polychromatic colour harmonies</li> <li>➤ Distinguish between colour harmonies for specific end use with reference to consumer psychology.</li> </ul> <p><b>Contents :</b></p> <p>Concept and end use with consumer psychology of</p> <ul style="list-style-type: none"> <li>• Achromatic colour harmony</li> <li>• Monochromatic colour harmony</li> <li>• Analogous colour harmony</li> <li>• Complementary colour harmony</li> <li>• Polychromatic colour harmony</li> </ul>

**Assignments:**

The assignments should be drawn on drawing sheets using wet colours wherever necessary.

**List of Assignments: (12 Designs)**

Preparation of painted designs:

1. Light theory of colour.
2. Pigment theory of colour.
3. Modification of colour. (Hue, Shade, Tint, Broken)
4. Apparent change of colour in combination.
5. Colour harmony, colour contrast.
6. Stripes designs.
7. Check designs.
8. Sari designs.
9. All over design - Diamond base.
10. All over design - Half drop base
11. All over design - Satin base.
12. All over design - Ogee base