

**M.D. UNIVERSITY, ROHTAK**  
**SCHEME OF STUDIES AND EXAMINATION**  
**B.TECH( TEXTILE CHEMISTRY)**  
**SEMESTER 3<sup>RD</sup> AND 4<sup>TH</sup>**  
**Scheme effective from 2019-20**



**COURSE CODE AND DEFINITIONS**

<b>Course Code</b>	<b>Definition</b>
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar

**M.D. UNIVERSITY, ROHTAK**  
**SCHEME OF STUDIES AND EXAMINATION effective from 2019-20**  
**Bachelor of Technology (Textile Chemistry)**  
**Third Semester**

Sr No.	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Class work	Theory	Practical	Total	
1	BSC-MATH-201G	Applied Statistics & Operation Research	3	0	0	3	3	25	75		100	3
2	BSC-TC-202G	Physical & Organic Chemistry	3	0	0	3	3	25	75		100	3
3	ESC-TC-203G	Polymer Science & Technology	3	0	0	3	3	25	75		100	3
4	PCC-TT/TC/FAE-201G	Introduction to Textile Industrial Practices	3	0	0	3	3	25	75		100	3
5	PCC-TT/TC/FAE-202G	Textile Raw Materials	3	0	0	3	3	25	75		100	3
6	PCC-TC/FAE-203G	Yarn Formation	3	0	0	3	3	25	75		100	3
7	LC-TT/TC/FAE-201G	Textile Industrial Survey	0	0	2	2	1	25		25	50	3
8	LC-TT/TC/FAE-202G	Fibre Microscopy & Identification	0	0	2	2	1	25		25	50	3
9	LC-TC/FAE-203G	Yarn Formation Lab	0	0	2	2	1	25		25	50	3
10	BSC-TC-203G	Qualitative Analysis of Organic Compounds	0	0	2	2	1	25		25	50	3
11	*MC-105G	Indian Constitution	0	0	2	2	0	50				
<b>TOTAL CREDITS</b>							<b>22</b>				<b>800</b>	

\*MC- 105G is a mandatory non credit course in which the student will be required passing marks

## BSC–MATH–201G Applied Statistics & Operation Research

Course code	BSC–MATH–201G				
Category	Basic Science Course				
Course title	Applied Statistics & Operation Research				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Mathematics and Statistics

### Course Objectives:

- To develop statistical and probability based skills amongst the students
- To make the students learn basic tools of Operations Research used in solving managerial problems

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

## UNIT I

### Basic Statistics:

Measures of Central tendency, Dispersion, moments, skewness and Kurtosis (definition, properties and associated numerical only); Correlation, Karl Pearson's coefficient of correlation, rank correlation, line's of regression and curve fitting (linear and parabolic)

## UNIT II

### Probability and Probability Distributions:

Concept of probability, additive and multiplicative laws of probability (Statements and associated numerical only);

Random variate: Mathematical expectation, theorems on expectation, discrete and continuous probability distributions (definition and problems only); Univariate Binomial, Poisson and Normal distributions (properties and applications)

### UNIT III

#### Sampling & Testing of hypothesis

Population and sample, types of sampling, sampling distribution of means and proportions (definition only)

Definition of statistical hypothesis, null hypothesis, type I and type II errors and level of significance.

Tests of significance for large and small samples (discussion) problem based on  $\chi^2$  test for goodness of fit, t-test, F-test and Analysis of variance (one way and two way classifications)

### UNIT IV

#### Operations Research

Linear programming problem (formulation and solution by graphical approach only); Transportation problem including time minimizing problems, Basic Assignment problem, sequencing problems (n jobs, 2 machines and n jobs, m machine problems);

Project scheduling by PERT/CPM: Definition of network, critical path, floats, finding of critical path and floats.

#### Reading List

##### Title

Mathematical Statistics

Business Statistics

Theory and problems of probability and Statistics

Operation Research

Operations Research for Management

Higher Engineering Mathematics

##### Author

Ray and Sharma

Gupta & Gupta

Murray P Spiegel

P.K. Gupta, Manmohan

Gupta & Sharma

B.S. Grewal

#### Course Outcomes:

After completion of the course, students will have the knowledge of:

- basic statistical parameters of measures of central tendency, dispersion, correlation, regression etc
- the concept of probability and probability distributions
- the concept of testing of hypothesis based upon sampling
- the concept of linear programming, transportation, assignment, sequencing problems as well as PERT/CPM

## BSC-TC-202G Physical & Organic Chemistry

Course code	BSC-TC-202G				
Category	Basic Science Course				
Course title	Physical & Organic Chemistry				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre-requisites:** Elementary idea of chemistry

### Course Objectives:

The course is designed to impart the following:

- Basic concepts of physical chemistry- colloids
- Knowledge of pH
- Basic concepts of Kinetics
- Fundamentals of organic chemistry reactions
- Basic knowledge of stereochemistry and it is used to understand the structure of chemical compounds.

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT-I

Stereochemistry: Isomerism and their classification, Structural, geometrical and optical isomerism; E, Z & R, S nomenclature. Basic concept of organic molecules: Introduction, Inductive effect, Mesomeric effect, Electrometric effect, Hyper-conjugation, Resonance, Effect of these factors on the physical and chemical properties of substance.

### UNIT-II

Homolytic and heterolytic fission of a covalent bond; Preparation, classification, structure and stability of Free radical carbocation, carbanions and carbene; Electrophile and nucleophile;

Organic Reactions and mechanism: Substitution Reactions, Types, Addition reactions, Types, Elimination reactions, Types and Rearrangement reactions; Directive influence of functional group in mono-substituted benzene;

### UNIT-III

Carbohydrates: Introduction, Classification. Properties, structure of Cellulose, Glycogen. Chemical Kinetics: Rate of reaction. Definition of rate of reaction according to the law of mass action and rate law, Molecular reaction, order of reaction, Types of order of reaction; Derivation of rate constant for first order and second order reaction. Methods of determination of order of reaction and numericals related to them.

### UNIT-IV

Colloidal Chemistry: Classification of particles i.e. colloids, crystalloids, suspension, Colloids Classification, preparation, purification and properties; Gels and emulsions; Application of Colloids.

pH of solution, Buffer Solution, Henderson's Equation and Numerical related to them. pH measurement by indicator and electrometric methods. Control and utility of pH in textile wet processing.

#### Reading List

##### Title

Principles of Physical Chemistry  
Text Book of Physical Chemistry  
Organic Chemistry (Vol I, II)  
Organic Chemistry  
Organic Chemistry

##### Author

Puri Sharma & Pathania  
Samuel Glastone  
IL Finar  
Singh & Mukherjee  
O P Aggarwal

#### Course Outcomes

The students will learn:

- To use colloids in Textile chemical processing.
- To control the rates of reaction in chemical processing.
- The effective use of pH.

## ESC-TC-203G Polymer Science & Technology

Course code	ESC-TC-203G				
Category	Engineering Science Course				
Course title	Polymer Science & Technology				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre-requisites:** Basic knowledge of physics and chemistry

### Course Objectives:

The course is designed to impart the following:

- Introduction to polymer technology that explores synthesis and physical properties of polymers
- To understand the various polymerization reactions

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT-I

Terms and definitions: Scope of polymer chemistry, plastics, fibres and rubbers; Basic determinants of polymers, Structure and property correlation; Chemistry of important monomers; Basic concepts of high polymers; Classification of polymerization reaction (addition, condensation) - their mechanism and kinetics with special reference to polyesters; polyamides; Co-polymerization and Rubber elasticity.

### UNIT-II

Techniques of polymerization (bulk, emulsion, solution, suspension etc); Concept of amorphous and crystalline polymer; Concept and determination of glass transition temperature; Thermal effect of polymers; Polymer viscosities and their determination; DSC, DTA, TGA. Visco-elastic and elastic properties of polymers;

### UNIT-III

Chemistry of cellulosic and other related polymers; Chemistry of degradation products of cellulose and their determination; The action of physical conditions and chemicals on cellulose; Chemistry of regenerated polymers like Viscose, polynosic and HWM rayon; Preparation of cellulose acetate;

#### **UNIT-IV**

Chemistry of polyamides and polyaramides - Kevlar, Nomex; Chemistry of protein polymers- wool and Silk; Chemistry of polyester and polyacrylonitriles; the effect of physical and chemical conditions on these polymers;

#### **Reading List**

##### **Title**

Organic Chemistry of Synthetic High Polymers  
Text Book of Polymer Science  
Polymer Science & Technology of Plastics & Rubber

##### **Author**

Robert W Lenz  
Fred W Billmeyer  
P Ghosh

#### **Course Outcomes**

The students will learn:

- Analyze different mechanisms of polymer formation and use this information in the synthesis of different polymers.
- Distinguish between absolute and relative methods for molecular weight determination.
- Use of structure property correlation for end use of textile polymer.
- Process steps of polymerisation reactions to produce various textile polymers.



## PCC–TT/TC/FAE–201G Introduction to Textile Industrial Practices

Course code	PCC–TT/TC/FAE–201G				
Category	Professional Core Course				
Course title	Introduction to Textile Industrial Practices				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subjects of Physics, Chemistry and Mathematics

### Course Objectives:

- To familiarize the students with different sectors of textile industry
- To make students learn about processes involved in yarn and fabric formation
- Understanding sequence of fabric chemical processing and garment designing processes
- Calculations pertaining to yarn numbering systems

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT-I

Introduction to different sectors of textile industry (organized as well as unorganized) including sectors based on technology such as Handloom, Powerloom, Garment, Cotton, Silk, Wool, Jute and Synthetics etc., Global Scenerio of these sectors: Number of units, size etc

Idea of Research and technology support to Textile Industry by Government Agencies;  
Strengths and weaknesses of Indian Textile Industry

### UNIT-II

Brief outline of Ginning, Sequence of operations for conversion of natural and manmade fibers into yarn viz Opening and Cleaning, drawing, combing, roving and different spinning processes. Introduction to doubling and winding;

Introduction to passage of material through weaving preparatory and fabric formation processes viz, weaving, knitting and nonwoven by flow charts and their objectives. Calculations pertaining to yarn numbering systems

### UNIT-III

Introduction to various textile chemical processes, General sequence used for chemical processing of textile materials viz fibre, yarn, fabric and garments. Brief outlines of various preparatory processes such as singeing, desizing, scouring, bleaching, mercerizing, etc., Overview of colouration processes viz dyeing and printing of textile materials, Introduction to different mechanical and chemical finishing processes. Basic idea of garment and knit processing processes.

### UNIT-IV

Sequence of operations for converting fabric to garment, Importance of Design; Introduction to fashion and retailing of readymade garments, Branding, Awareness of trends and accessories, Different sectors of garment manufacturing units, export houses, buying houses. Brief idea of garment imports/exports of different countries

#### Reading List

<b>Title</b>	<b>Author</b>
Cotton Spinning	K Ganesh & A R Garde
Cotton Yarn Weaving	RN Kanungi & AR Garde
Principles of Weaving	Marks & Robinson
Textiles Fibre to Fabric	Corbmann
Fundamental Principles of Textile Processing	V A Shenai
Technology of Clothing Manufacture	Carr & Latham

#### Course Outcomes:

At the end of the course, the students will:

- be familiar with all the processes of textile industry
- have the knowledge of global scenario of different sectors of textile

## PCC–TT/TC/FAE–202G Textile Raw Materials

Course code	PCC–TT/TC/FAE–202G				
Category	Professional Core Course				
Course title	Textile Raw Materials				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subjects of Physics, Chemistry and

Mathematics **Course Objectives:**

- To provide basic knowledge of terms used in textiles
- To familiarize the students with details of raw materials used in textile industry
- To make students learn about natural and man made fibre details

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT-I

General definitions and important terminologies related to textiles; Classification of fibres; Essential and desirable properties of textile fibres and their role in final products; Advantages and disadvantages of natural and manmade fibres;

Cotton: Geographical distribution, structure and properties (physical and chemical); Different varieties including organic as well as Bt cotton and their properties; Applications.

### UNIT-II

Bast and leaf fibres such as jute, hemp, sisal and ramie etc: Geographical distribution, extraction, properties and their uses.

Varieties of natural silk, rearing of silk worm, properties and uses of various types of silk; silk reeling, throwing and weighing.

### UNIT-III

Varieties, sorting and grading of wool, chemical and physical properties of wool, processes involved in the removal of impurities from raw wool, numbering systems of woollen and worsted yarns. General principles of manufacturing of man made fibres.

### UNIT-IV

Brief outline of the manufacturing processes of important man-made fibres, viz. rayons (Viscose and Acetate), polynosic, tencel, nylons, polyester, acrylics, polypropylene, polyolefins, polyacrylonitrile and some technical speciality fibres like spandex/lycra etc (only flow charts); their Important physical and chemical properties and applications.

#### Reading List

##### Title

##### Author

Textile Fibres

HVS Murthy

Manmade Fibres

RW Moncrieff

Manufactured Fibre Technology

V B Gupta & V K Kothari

#### Course Outcomes:

At the end of the course, the students will be:

- familiar with different types of natural and man made fibres
- having the knowledge of physical and chemical properties of natural and man made fibres
- able to explore the applications of different types of natural and man made fibres

### PCC–TC/FAE–203G Yarn Formation

Course code	PCC–TC/FAE–203G				
Category	Professional Core Course				
Course title	Yarn Formation				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subjects of Physics, Chemistry and Mathematics

#### Course Objectives:

- To familiarize the students with objectives of initial stages of yarn formation viz. Ginning, Mixing and Blending, Blowroom and Card, Drawing-in, Combing and Roving
- To make the students understand basic mechanisms involved in different stages of yarn formation viz..Ring frame, Open-end spinning, DREF spinning, Air-Jet spinning
- To make the students learn about plying, twisting, sewing thread, Yarn quality, Yarn Numbering Systems, etc.
- To make students learn calculations related to various stages of yarn formation viz. Blowroom and Card, Draw frame, Roving, ring frame and yarn numbering

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

#### UNIT I

Brief introduction of the subject; Objectives of ginning; Mixing and Blending: Objectives. Introduction to various preparatory processes involved in the production of yarn viz. opening and cleaning (blow room and card), drawing (draw frame), combing (comber) and rove formation (speed frame) with the objectives of each process.

#### UNIT II

Introduction to different processes involved in the production of yarn viz. conventional (ring spinning) and unconventional (rotor, air-jet and friction spinning etc) with the objectives of each. Properties and end uses of different types of yarns such as ring spun, rotor spun, friction spun and air-jet spun etc.

### UNIT III

Objectives of plying and twisting of spun and filament yarns; Objectives and process description of reeling; Brief description of fancy yarns: ply cable yarn; core spun yarn, sewing threads, slub yarn, grindle, mélange yarns etc.

### UNIT IV

Essential properties of a sewing thread. Concept of yarn quality and its importance, Yarn numbering systems and calculations pertaining to conversions,

#### **Title**

Cotton Ginning, Textile Progress Vol.24 No.2 I  
Spun Yarn Technology, Vol I& II  
Short Staple Spinning Volume-I, II, III & IV  
Spinning of Manmade & Blends on Cotton Systems  
Technology of Carding  
Manufactured Fibre Technology  
Spun Yarn Technology

#### **Author**

Doraiswamy, P Chellamani  
A Venkatasubramani  
W Klein  
KR Salhotra  
R Chattopadhyay  
V B Gupta & V K Kothari  
Eric Oxtoby

#### **Course Outcomes**

At the end of the course, the students will:

- have the knowledge of Ginning, Mixing and Blending, the initial processes of yarn formation;
- have learnt the principle and working of different machines of Yarn formation
- be familiar with the Ply yarn, Yarn Twist, sewing thread, Yarn Quality, Yarn Numbering System;
- be able to calculate various parameters like draft, production and efficiency related to different machines of yarn formation as well as conversion factors of different yarn numbering systems.

### LC–TT/TC/FAE–201G Textile Industrial Survey

Course code	LC–TT/TC/FAE–201G				
Category	Professional Core Course				
Course title	Textile Industrial Survey				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subjects of Physics, Chemistry and

Mathematics **Course Objectives:**

- The course is designed to make students learn writing reports of survey/practical visits to textile industrial units

**Contents:**

Study and survey of textile industries spread over India as well as Global areas specifically in nearby places, through practical visits and internet facilities; Preparation of report of the survey and highlight salient features of specific sectors involved like spinning, weaving, knitting, process house, garment manufacturing, Label manufacturing, export and buying houses etc

**Course Outcomes:**

- At the end of this course the students will be able to survey and prepare the reports of any Industrial unit specifically in textile fields

## LC–TT/TC/FAE–202G Fibre Microscopy & Identification

Course code	LC–TT/TC/FAE–202G				
Category	Professional Core Course				
Course title	Fibre Microscopy & Identification				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subjects of Physics, Chemistry and Mathematics, Textile Raw

### Materials Course Objectives:

The Lab course is designed to make students learn

- identification of textile fibres and filaments
- identify the burning behavior, microscopically structure and chemical solubility of different textile fibres
- blend analysis

### Contents:

Principle of microscopy, Microscopic identification of fibres, preparation and mounting of specimen for longitudinal view, Cross-section cutting. Microtomy - cork method, metal plate method, Hardy's Microtome, Mountants and reagents for fibre microscopy; Identification of fibres through burning as well as solubility tests. Standard schemes of analysis of homogenous fibre blends by physical and chemical methods; Qualitative and quantitative determination of components; Preparation of reagents used for chemical analysis.

### Reading List

#### Title

Hand book of textile fibres  
Textile Fibres

#### Author

J Gordan Cook  
HVS Murthy

### Course Outcomes:

After completion of the course, students will have the knowledge of:

- the burning tests, microscopic tests and solubility tests for identification of the textile fibers
- chemistry involved in various practical tests
- various tests for analysis of blends of two or more fibres



## LC–TC/FAE–203G Yarn Formation Lab

Course code	LC–TC/FAE–203G				
Category	Professional Core Course				
Course title	Yarn Formation Lab				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subjects of Physics, Chemistry and Mathematics, Yarn formation

### Course Objectives:

- This Lab course is designed to impart first-hand experience of handling different yarn formation machineries as a bridge between theory and practice.

### Contents

Discussion and demonstration of the various machines and of manufacturing processes involved in converting fibres to yarn viz. mixing, blending, opening, cleaning, carding, drawing, combing, rove formation, spinning, doubling etc.; Introduction to unconventional spinning machines/processes; Rotor spinning, Air-jet spinning and Friction spinning etc.; Simple Calculations pertaining to these machines/processes

### List of Experiments:

1. To study the objectives of Blow room, mixing and blending. Draw the flow of material through blowroom line and discuss the functions of each machine and its parts
2. To study the objectives of CARDING machine. Draw the flow of material through a card and label various parts. Also discuss the functions of each parts
3. To study the objectives of COMBING machine. Draw the flow of material through a combing and label various parts. Also discuss the functions of each parts
4. To study the objectives of DRAW FRAME. Draw the flow of material through a draw frame and label various parts. Also discuss the functions of each parts

5. To study the objectives of SPEED FRAME. Draw the flow of material through a SPEED frame and label various parts. Also discuss the functions of each parts
6. To study the objectives of RING FRAME. Draw the flow of material through a RING frame and label parts. Also discuss the functions of each parts
7. To study the objectives of MODERN SPINNING MACHINES. Draw the flow of material through the various machines and label different parts. Also discuss the functions of each machines and its parts
8. To study the objectives of WINDING machine. Draw the flow of material through Winding machine and discuss the functions of each machine and its parts
9. Draw the flow of material through Ring-doubler and discuss the functions of each machine and its parts.
10. To study the objectives of TFO. Draw the flow of material through TFO machine and discuss the functions of each parts

**Course Outcomes:**

At the end of this course the students will be able to:

- understand the blowroom line, mixing, blending and sequence of machines in the blowroom line;
- understand carding, draw frame, combing, speed frame, ring frame for processing different materials;
- understand winding, ring doubler, TFO, different types of Tensioners and Yarn clearers, packages, drums for processing different materials.

## BSC–TC–203G Qualitative Analysis of Organic Compounds

Course code	BSC–TC–203G				
Category	Basic Science Course				
Course title	Qualitative Analysis of Organic Compounds				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subject Chemistry and Physical & Organic

### Chemistry **Course Objectives:**

The Lab course is designed to make students learn

- the identification of extra elements in organic compounds.
- the identification of various functional groups in organic compounds.
- the formation of derivatives of organic compounds.

### **Contents:**

Detection of extra elements (i.e. Nitrogen, Sulphur & Halogenes and functional groups (i.e. Carboxyl, Phenolic, Alcoholic, Aldehydic, Ketonic, Esteric, Amides, Amines, Anilides, Thioamides, Nitro, Carbohydrate and hydrocarbons Test for Aromaticity of unsaturation in organic compounds. Determination of melting and boiling point of the organic compounds; Formation of derivatives of organic compounds; Determination of melting / boiling point of the derivatives

### **Course Outcomes:**

- Students will have the knowledge of analysis of various basic organic compounds and their derivatives.
- They understand the determination of melting and boiling points of organic compounds and their derivatives.

## CONSTITUTION OF INDIA

Class Work : 50

Course Code	MC-105G		
Category	Mandatory Course		
Course title	Constitution of India (Theory)		
Scheme	L	T	P
	0	0	2

### CONSTITUTION OF INDIA– BASIC FEATURES AND FUNDAMENTAL PRINCIPLES

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950.

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

## **COURSE CONTENTS**

1. Meaning of the constitution law and constitutionalism.
2. Historical perspective of the Constitution of India.
3. Salient features and characteristics of the Constitution of India.
4. Scheme of the fundamental rights.
5. The scheme of the Fundamental Duties and its legal status.
6. The Directive Principles of State Policy – Its importance and implementation.
7. Federal structure and distribution of legislative and financial powers between the Union and the States.
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

## **REFERENCES:**

1. The Constitutional Law Of India 9<sup>th</sup> Edition, by Pandey. J. N.
2. The Constitution of India by P.M.Bakshi
3. Constitution Law of India by Narender Kumar
4. Bare Act by P. M. Bakshi

**M.D. UNIVERSITY, ROHTAK**  
**SCHEME OF STUDIES AND EXAMINATION effective from 2019-20**  
**Bachelor of Technology (Textile Chemistry)**  
**Fourth Semester**

Sr No.	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)			Duration of Exam (Hours)
			L	T	P			Class work	TheoryPractical	Total	
1	HSMC-EIE-201G	Entrepreneurial and Industrial Engineering	3	0	0	3	3	25	75	100	3
2	ESC-TT/TC/FAE-201G	Computer Aided Textile Designing	3	0	0	3	3	25	75	100	3
3	ESC-TC-204G	Unit Organic Process & Chemical Engineering	3	0	0	3	3	25	75	100	3
4	PCC-TT/TC-206G	Man-Made Fibre Production	3	0	0	3	3	25	75	100	3
5	PCC-TC/FAE-204G	Fabric Formation	3	0	0	3	3	25	75	100	3
6	PCC-TC-205G	Preparatory Wet Processing	3	0	0	3	3	25	75	100	3
7	ESC-TT/TC/FAE - 202G	Computer Aided Textile Designing Lab	0	0	2	2	1	25	25	50	3
8	LC-TC/FAE-204G	Fabric Formation Lab	0	0	2	2	1	25	25	50	3
9	LC-TC-205G	Preparatory Wet processing Lab	0	0	2	2	1	25	25	50	3
10	LC-TC-206G	Analytical Chemistry Lab	0	0	2	2	1	25	25	50	3
11	*MC-108G	Essence of Indian Knowledge Tradition	0	0	2	2	0	50			
<b>TOTAL CREDITS</b>							<b>22</b>			<b>800</b>	

**NOTE:** At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

\*MC- 108G is a mandatory non credit course in which the student will be required passing marks

## HSMC–EIE–201G Entrepreneurial and Industrial Engineering

Course code	HSMC–EIE–201G				
Category	Humanities and Social science including Management courses				
Course title	ENTREPRENEURIAL AND INDUSTRIAL ENGINEERING				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic concepts of Social Sciences

### Course Objectives:

The course is designed to make the students understand the:

- concepts of Entrepreneurship and Entrepreneurial Skills;
- ways of preparation of project reports, their components and feasibility studies
- principles of management;
- concepts of Industrial Engineering.

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT I

Entrepreneurship: Meaning and concept, role of entrepreneurship in economic development & new economic reforms, Entrepreneurial Skills, decision process, Factors influencing entrepreneurship; Business Opportunity Identification; Preparing a Business Plan and project reports, Significance, components and feasibility studies of business plans/project reports, Importance of new venture financing, sources of financing

### UNIT II

Industrial Parks (Meaning, features with examples); Special Economic Zone (Meaning, features with examples); Financial institutions and agencies, MSME, Small Scale Industries, Introduction to SIDBI, IDBI, IFCI and various Government agencies like NABARD etc, Carry on Business (COB) licence, Environmental Clearance, Introduction to various industrial hazards like fire,



mechanical and electrical etc, Introduction to safety rules for prevention of accidents, National Small Industries Corporation Rules and regulations for exemption from income tax, excise clearance etc., Claiming of draw back in export business.

### UNIT III

Productivity – importance, concepts and measurements, Work study, Method study, micro -motion study, Production planning and control- Importance of planning - job, batch and mass production- Introduction and need for a new product, Functions of production control at macro and micro levels - Routing , Scheduling, dispatching and follow up etc. Ergonomics and its importance

### UNIT IV

Introduction to Industrial Engineering - Evolution of modern Concepts in Industrial Engineering - Functions of Industrial Engineering, application of Industrial Engineering. Facility location factors and evaluation of alternate locations, Types of plant layout and their evaluation, Assembly line balancing, Materials handling systems, Inventory Control, inventory control techniques. Job evaluation, merit rating, incentive schemes, and wage administration, Quality control and Inspection.

#### Reading List

##### Title

Project Feasibility Analysis  
Environment & Entrepreneur  
Environment & Entrepreneur  
Planning a Small Scale Industry: A Guide to Entrepreneurs  
Developing Entrepreneurship-A Handbook Learning System  
  
Motion and Time study  
Engineered work Measurement  
Work Study and Ergonomics  
Introduction to Work Study  
Work Study

##### Author

Cliffon, Davis S & Fyfie, David E  
A N Desai  
P F Drucker  
R Jain  
Pareek, Udai and Venkateswara  
Rao  
Ralph M Barnes  
Weldon, ELBS, Marvin E Mundel  
S Dalela and Sourabh  
ILO  
Ralph & Barnes

#### Course Outcomes

At the end of the Course, the students will be able to:

- Take the right decisions to optimize resources utilization by improving productivity of the Materials, Machines, Money, Methods, Manpower and Management effectively;
- find alternative best productive methods reducing time, improving human efficiency and minimising waste;
- understand the functions and applications of Industrial Engineering.

## ESC–TT/TC/FAE–201G Computer Aided Textile Designing

Course code	ESC–TT/TC/FAE–201G				
Category	Professional Core Course				
Course title	Computer Aided Textile Designing				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subjects of Physics, Chemistry, Mathematics and

**Computer Course Objectives:**

- To introduce computer softwares and hardwares related to textile designing;
- To make students learn basic tools and designing techniques used in textile and Apparel sectors;
- To make students understand applications of CAD for colour and weave designs.

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT I

Fundamentals of CAD: Definition, History, Hardware and Software requirements of CAD, Design Process, Application areas of computer aided design and manufacturing in textile and apparel industry, Introduction to Computer Graphics, Raster and Vector Graphics features.

### UNIT II

Hardware in CAD: Introduction, Design workstation, Graphics terminal, input and output devices, central processing unit and secondary storage. Arrangement of figures - unit-repeating design, the drop device, drops reverse designs, system of distribution with reference to diamond base, ogee base, and rectangular base lines. Construction of designs from incomplete repeat, classification of borders patterns, all over patterns and types

### UNIT III

Selection tools in adobe Photoshop: selection by shape, colour and mask, Colour specification tools, Image adjustment modes, layer blending modes and their options. Different brush tools and their dynamics options, Colour fill: Paint and gradient, Clone tool, colour modification via dodge, burn, colour replacement, mixer etc. Layer masking, Texture mapping, Filter applications for fancy effects, layer functions, working with displacement maps, texture maps. Basic vector shape drawing tools, shape editing via anchor points etc.

## UNIT IV

Introduction to Corel Draw Interface Tool Box, Working with shape drawing tools for lines, rectangles, squares, circles, ellipses, polygons, stars and spirals etc. Object transformations as rotation, scaling etc. freely and for specific dimensions, Selecting Objects, reshaping, duplicating, grouping, trimming, locking and unlocking, aligning objects. Introduction to curves, nodes and segments; Drawing freehand tools; Drawing and selecting closed curves and nodes, adding, removing and joining nodes. Bezier tool, drawing curve and straight line with bezier tools, Colour fill and options

### Reading List

<b>Title</b>	<b>Author</b>
Computer Aided Design & Manufacturing	Mickle P Groover, Emory W. Zimmers Jr
Computer Graphics Principles & Practices	James D Foley, Andeies Van Da Shvan K Feiner. John F Hughes
Computer Graphics	Donald Mearn & M Pauline, Baker
“Watsons Textile Design and Colour”	Grosiciki, Newnes Buttersworth, 1988

### Course Outcomes:

After completion of the course students will:

- be familiar with computer fundamentals for Computer Aided Designing
- have the knowledge of computer softwares and basic tools for textile designing
- know the elements and principles of design and their applications in textile designing through

CAD

## ESC-TC-204 G Unit Organic Process & Chemical Engineering

Course code	ESC-TC-204 G				
Category	Professional Core Course				
Course title	Unit Organic Process & Chemical Engineering				
Scheme and Credits	L	T	P	Credits	Semester-IV
	3	0	0	3	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre-requisites:** Basic knowledge of physics, chemistry and mathematics

### Course Objectives:

The course is designed to impart the following:

- Understand the concept of unit organic processes.
- Industrial use of substitution reactions.
- Elementary idea of unit operations of chemical engineering

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT-I

Definition of unit process and unit operation; Study of following unit organic processes with one or two methods of manufacture with flow sheet for each process; Nitration, sulphonation, oxidation, halogenation, alkylation; Diazotization and coupling; Manufacture of dye intermediates based on above processes.

### UNIT-II

Definition and scope of chemical engineering, Unit operations of chemical engineering, material balance and molecular units, mole fractions, Gas laws, simple calculations based on these laws. Corrosion and material of construction

### UNIT-III

Mechanical separation: Introduction to screens and screening equipment. Size reduction: Crushing and grinding machinery; Introduction to theory of size reduction, power consumption. Drying: Classification of dryers and various types of dryers used in chemical process industry; Equilibrium moisture content, bound, unbound and free water; Evaporation: Evaporator types and their description.

#### UNIT-IV

Simple treatment of fluid flow, heat transfer, heat exchangers. Distillation: Terms and definitions and differential distillation; Industrial hazards in chemical industry;

#### Reading List

Title	Author
Unit Processes in Organic Syntheses	R H Groggins
Chemistry of Synthetic dyes	K Venkataraman
Introduction to Chemical Engineering	WL Badger
A Text Book of Engineering Chemistry	MM Uppal
A Glimpse on the Chemical Technology of Textile Fibres	RR Chakraborty

#### Course Outcomes

The students will learn:

- To use unit organic process for production of intermediates and dyes.
- Effective use of various unit operations of chemical engineering in textile processing.
- Working of dryers, heat exchangers and evaporator.

## PCC–TT/TC–206 G Man–Made Fibre Production

Course code	PCC–TT/TC–206 G				
Category	Professional Core Course				
Course title	Man–Made Fibre Production				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subjects of Physics, Chemistry and Mathematics

**Course Objectives:**

The course is designed to make students learn:

- the basic concepts of fibre forming polymers
- various manufacturing systems of man made fibres
- processes and chemical reactions involved during manufacturing of typical fibres

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT I

General definitions related to man-made/manufactured fibres. Introduction to manufacturing processes of these fibres. Study of various spinning systems: melt, wet & dry spinning – basic principles. Brief details of spinning head, spinneret, quench chamber, drying chamber & coagulation bath. Spin finish applications.

### UNIT II

Regenerated fibres: Viscose rayon – detailed manufacturing process with reactions at each stage. Polynosics, Super high wet modulus rayons, Brief manufacturing processes of Lyocell and Tencel fibres.

### UNIT III

Polyacrylonitrile: Addition of comonomers, continuous suspension, polymerization techniques; Solution spinning techniques; Coagulation bath variables; Macrovoid generation and their remedies; Effect of spinning variables on structure and properties of gel and final fibres.

Polypropylene: Polymerisation techniques (suspension & gas phase), Superactive catalysts and their composition; major drawbacks and their possible remedies; Spinning of filaments.

#### UNIT IV

Polyethylene terephthalate: Polymerisation techniques (batch & continuous), side reactions, degradation reactions – their control, Production of filament yarns and staple fibres, Brief description of manufacturing technique of high tenacity polyethylene terephthalate.

Nylon 6 & nylon 66: Polymerisation techniques in VK tube (batch & continuous) along with side reactions, Integrated continuous process for nylon 66, Filament spinning technique.

#### Reading List

Manmade fibres

Manufactured Fibre Technology

Production of Synthetic Fibres

RW Moncrieff

V. B. Gupta and V.K. Kothari

A.A. Vaidya

#### Course Outcomes:

After completion of the course, students will:

- have the knowledge of essential requirements for fibre forming polymers
- be familiar with different techniques of fibre production systems
- have the knowledge of raw materials used for producing different man made fibres;
- be familiar with the chemical reactions occurring during the manufacture of typical fibres

### PCC–TC/FAE–204G Fabric Formation

Course code	PCC–TC/FAE–204G				
Category	Professional Core Course				
Course title	Fabric Formation				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Chemistry, Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subjects of Physics, Chemistry and Mathematics

#### Course Objectives:

The course is designed to make students learn:

- the basic concepts of fabric forming processes
- various manufacturing systems of woven fabrics
- processes involved during manufacturing of woven fabrics , their defects and remedial measures

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

#### UNIT I

Introduction to Clothing Science, Factors involved in the study of clothing; General functional description of clothing; Classification of various types of Cloths, Fabrics according to end uses, manufacturing processes, raw material, etc. Introduction to various fabric manufacturing methods, conversion of yarn into fabric with flow charts, Introduction of warp and weft preparatory processes. Winding: Objectives, types of packages, Flow of material on a winding machine, Brief idea about different devices in a winding machine. Warping: Objectives of warping, Direct and sectional warping

#### UNIT II

Sizing: Objectives of sizing. Various sizing ingredients; Drawing-In: Objectives and flow of material in these operations. Pirn winding, Shuttle Looms: Definition of handloom, plain loom, and automatic



loom. , General passage of material through loom, description of important parts of a loom, basic loom mechanisms; primary, secondary and auxiliary motions.

### UNIT III

Brief introduction and overview to Shuttleless looms; their advantages over shuttle looms. Terms used for all woven fabrics, Ways to Distinguish Warp & Filling Yarns, Fabric properties- dimensional/structural, mechanical properties related to performance and durability, aesthetic properties. Functional and comfort related fabric properties Fabric quality attributes, Influence of fibres, yarn characteristics and fabric construction parameter on fabric properties. .

### UNIT IV

Fabric defects; classification, reasons, point rate system for cloth grading, drawbacks of point system, fabric inspection. Introduction about followings; Knitted fabrics, narrow fabrics, briefing about dobby and jacquard, some standard fabrics, introduction to non woven fabrics, Fabrics from yarns; braids, nets, laces, Composite Fabrics; coated fabrics, laminated fabrics, bonded fabrics and tufted fabrics. .

#### Reading List

<b>Title</b>	<b>Author</b>
Principles of Weaving	Marks & Robinson
Cotton Yarn weaving	ATIRA
Textile Science	Cobmann
NCUTE's Manual	
Weaving: Conversion of Yarn to Fabric	P R Lord and M H Mohamed

#### Course Outcomes:

After completion of the course, students will:

- have the knowledge of essential requirements for fabric forming processes
- be familiar with different techniques of fabric production systems
- have the knowledge of raw materials used, size ingredients for producing woven fabrics;
- be familiar with the fabric defects, remedial measures, and other types of fabrics

## PCC–TC–205 G Preparatory Wet Processing

Course code	PCC–TC–205 G				
Category	Professional Core Course				
Course title	Preparatory Wet Processing				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Knowledge of Introduction to Textile Processes

### Course Objectives:

The course is designed to impart the following:

- Concept of preparatory wet processing of cotton and synthetic textiles
- Overview of various machines involved in preparatory wet processes

**Note:** Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT-I

Impurities in fibres and greige fabrics (Cotton, Wool, Silk and Synthetic fibre) Preparatory sequences required for their removal; Chemistry and technology of singeing, desizing, scouring and bleaching of natural and man-made fibre fabrics and their blends;

### UNIT-II

Machines used for batch wise and continuous scouring and bleaching; Mechanism of bleaching by various bleaching agents such as bleaching powder, sodium hypochlorite, hydrogen peroxide, sodium chlorite etc.

### UNIT-III

Combined preparatory processes and energy conservation; Faults in scouring and bleaching and their prevention; Methods used for determination of degradation during scouring and bleaching;

Determination of oxi-cellulose and hydrocellulose; Determination of efficiency of various preparatory processes;

#### **UNIT-IV**

Physical and chemical aspects of mercerization, Efficiency of mercerization, Machines for yarn and fabric mercerization, hot mercerization and Liquid ammonia treatment.

#### **Reading List**

##### **Title**

Chemical Technology in Pretreatment processes of Textiles  
Textile Scouring and Bleaching  
Technology of Bleaching & Mercerizing

##### **Author**

S R Karmarkar  
E R Trotman  
VA Shenai

#### **Course Outcomes:**

- To understand preparatory wet processing of cotton fabric.
- To understand the chemistry involved in the various chemical pre-treatment of textiles.
- To know the concept of Pre-treatments with relevant machines and procedure.

## ESC-TT/TC/FAE –202 G Computer Aided Textile Designing Lab

Course code	ESC-TT/TC/FAE-202 G				
Category	Engineering Science Course				
Course title	Computer Aided Textile Designing				
Scheme and Credits	L	T	P	Credits	Semester-IV
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

**Pre-requisites:** Basic Science subjects of Physics, Chemistry, Mathematics and

**Computer Course Objectives:**

- This Lab course is designed to impart first-hand experience of handling CAD softwares for Textile Designing thus serving as a bridge between theory and practice.

**Contents:**

Warp and Weft Colour Pattern designing using Elements of design and Principles of designs, like line, dot, print etc.; Types of lines and their application in designing; Types of dots as polka dot, etc. General idea about weave and colour effect; Composition of designs–by Geometric ornamentation by the conventional treatment of natural and artificial forms and by the adoption and reproduction of earlier designs; Geometric ornamentation, construction of symmetrical figures, Reversing inclined figures; Practical Application of Elements of Design and Principles of design using CAD.

Weave designing using Arrangement of figures- unit-repeating design, the drop device, drops reverse designs, sateen system of distribution (with reference to half drop, diamond base, ogee base, rectangular base lines). Construction of designs from incomplete repeat; Border designing: Study of pattern–historical precedents. Symmetry–principle concepts, perspectives and its application, classification of motifs, border patterns, all over patterns; CAD practical application in Weave designs, arrangement of figures, Border designing and Motif and repeat making.

**List of Experiments:**

1. To study different selection option tools in Adobe Photoshope
2. To study imge adjustment modes and tools in graphic designing software

3. To study different image transformation tools
4. To create motif vector by print designing
5. To create shade cards of above designed print
6. To create textile patterns for designed prints
7. To study different colour modification tools
8. To drape designed fabric patterns on apparels and fashion accessories
9. To design fashion show ramp using previously designed apparels and accessories
10. To design technical and graphical parameters of yarn
11. To develop fabric using above designed yarn as per the desired weave parameters

**Course Outcomes:**

The students will be able to practically handle:

- elements and principles design using CAD systems;
- arrangement of figures and motifs using various methods
- geometrical ornamentation
- placement of patterns in symmetric and asymmetric way;
- creation of Border designs.

### LC-TC/FAE-204G Fabric Formation Lab

Course code	LC-TC/FAE-204G				
Category	Professional Core Course				
Course title	Fabric Formation Lab				
Scheme and Credits	L	T	P	Credits	Semester-IV
	0	0	2	1	
Branch	Textile Chemistry, Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

**Pre-requisites:** Basic Science subjects of Physics, Chemistry and Mathematics

#### Course Objectives:

- This Lab course is designed to impart first-hand experience of fabric formation techniques, demonstration of working principles of winding, warping, drawing-in and weaving thus serving as a bridge between theory and practice.

#### Contents

Basic principles of woven fabric analysis: estimation of data for cloth reproduction, Identification of yarns and materials used in their construction. Weave analysis, Sett, Cover factor, Count and weight calculations for simple and compound woven structures, Specifications of standard woven fabric.

Discussion and Demonstration of various machines and of manufacturing processes involved in converting yarns to fabric winding, warping, sizing, Drawing-in, weaving by Hand looms, Plain Looms; Automatic Shuttle Looms, Shuttleless Looms and Knitting, Passage of material through them and brief study of their essential components and mechanisms; Simple production and efficiency calculations pertaining to these processes.

#### List of Experiments:

- Study of Winding Process
- Study of Warping Process
- Study of Slasher Sizing
- Study of Drawing-in Process
- Study of Pirn Winding Process
- Introduction to Shuttle Loom
- Study of Conventional Shedding Mechanisms

- Study of Shuttle Picking Mechanisms
- Study of Crank Beat-up Mechanism in Shuttle loom
- Analyse different types of weave designs
- Analyse different constructional parameters of woven fabrics like yarn linear density, end and picks per unit length, fabric cover, fabric areal density

**Course Outcomes:**

After completion of the course, students will be able to:

- correlate between theory and practice of the concept of weaving preparatory methods
- visualise the layout and structure of weaving preparatory machines along with their primary components
- visualise the mechanisms of primary motions of shuttle weaving machines and comprehend their settings
- develop practical skills relevant to industrial practices.
- recognise different types of weave designs
- analyse different constructional parameters of woven fabrics like yarn linear density, end and picks per unit length, fabric cover, fabric areal density

### LC-TC-205 G Preparatory Wet Processing Lab

Course code	LC-TC-205 G				
Category	Laboratory Course (Professional Core Course)				
Course title	Preparatory Wet Processing Lab				
Scheme and Credits	L	T	P	Credits	Semester-IV
	0	0	2	1	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

**Pre-requisites:** Basic Science subjects of Physics, Chemistry and Mathematics, Preparatory wet processing

#### Course Objectives:

- This Lab course is designed to impart first-hand experience of cotton fabric pretreatments employed in chemical processing thus serving as a bridge between theory and practice.

#### Contents

Desizing of cotton by enzymatic and oxidative method; Scouring by caustic soda boil and enzymatic scouring; Bleaching using Sodium hypochlorite and hydrogen peroxide and assessment process of bleaching process; Two stage and single stage preparatory processes; Scouring and bleaching of wool; Degumming and bleaching of silk; Scouring and bleaching of polyester and blends; Mercerization of cotton by various methods.

#### Course Outcomes:

- To understand basic concept of preparatory wet processing treatments of cotton fabric.
- Single stage and combined pre-treatment processes for cotton textiles.
- Different types of bleaching methods for cotton rich textiles with their evaluation.
- Basic pretreatments of woolen textiles.
- Degumming and other pre-treatments for silk materials.



### LC–TC–206 G Analytical Chemistry Lab

Course code	LC–TC–206 G				
Category	Laboratory Course (Professional Core Course)				
Course title	Analytical Chemistry Lab				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

**Pre–requisites:** Basic Science subjects of Physics, Chemistry and Mathematics, Polymer science & Technology

#### Course Objectives:

- This Lab course is designed to estimate the various commercial used chemicals in textile chemical processing.
- Degradation products of cellulosic polymers to understand damages in cotton textiles

#### Contents:

Brief concept pH; principle of pH measurement and use of pH meter; Estimations from dye intermediates based on idometric titrations; Estimation of available chlorine in hypochlorite bath and peroxide content in hydrogen peroxide bath; Analysis of free formaldehyde; Determination of copper number; methylene number and carboxyl group in degraded cellulose; determination of barium activity number;

#### Course Outcomes:

- To understand significance of pH in wet processing.
- To understand the various types of degradations in cellulosic polymers.
- To estimate the commercial used reducing and oxidizing agents in textile chemical processing.

## MC-108G Essence of Indian Knowledge Tradition

Course code	MC-108G				
Category	Mandatory Course				
Course title	Essence of Indian Knowledge Tradition				
Scheme and Credits	L	T	P	Credits	Semester-IV
	0	0	2	0	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	50 Marks				
Exam	00 Marks				
Total	50 Marks				
Duration of Exam	00 Hours				

**Pre-requisites:** Basic Science subjects of Physics, Chemistry and

Mathematics **Course Objectives:**

The course is designed to impart the following:

### Course objective

The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions. Part-I focuses on introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.

### Course Contents

- Basic structure of Indian Knowledge System: अष्टादशविद्या -४वेद,४उपवेद (आयुर्वेद, धनुर्वेद, गन्धर्ववेद, स्थापत्य आदि) द्वेदांग (शिक्षा, कल्प, निरुक्त, व्याकरण, ज्योतिष, छंद) ४ उपाङ्ग (धर्मशास्त्र, मीमांसा, पुराण, तर्कशास्त्र)
- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case studies