VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
SCHEME OF SYLLABUS - 2017
III SEMESTER B.TECH. (TEXTILE TECHNOLOGY) / B.TECH. (SILK TECHNOLOGY)
(Common to Textile & Silk Tech. Courses)

Sl. No.	Sub. Code	Title	Teaching Dept.	Teaching Hours/ Week		Examination				Credits
				Theory	Practical	Duration	Theory/ Practical Marks	IA Max Marks	Total Marks	
1.	17TX31	Textile Polymer Science	Textile / Silk	04	--	03	60	40	100	4
2.	17TX32	Textile Fibres	Textile / Silk	04	--	03	60	40	100	4
3.	17TX33	Spinning Technology - I	Textile / Silk	04	--	03	60	40	100	3
4.	17TX34	Fabric Manufacturing Technology - I	Textile / Silk	04	--	03	60	40	100	4
5.	17TX35	Chemical Processing of Textiles - I	Textile / Silk	04	--	03	60	40	100	4
6.	17TXL36	Spinning Technology Lab.-I	Textile / Silk	--	03	03	60	40	100	2
7.	17TXL37	Fabric Manufacturing Technology Lab - I	Textile / Silk	--	03	03	60	40	100	2
8.	17TXL38	Chemical Processing of Textiles- Lab - I	Textile / Silk	--	03	03	60	40	100	2
9.	17KL/CPH 39/49	Kannada/Constitution of India, Professional Ethics and Human Rights	Humanities	01	--	01	30	20	50	1
		TOTAL		**20**	**09**	**24**	**480**	**320**	**800**	26

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
SCHEME OF SYLLABUS - 2017

IV SEMESTER B.TECH. (TEXTILE TECHNOLOGY) / B.TECH. (SILK TECHNOLOGY)
(Common to Textile & Silk Tech. Courses)

Sl. No.	Sub. Code	Title	Teaching Dept.	Teaching Hours/ Week		Examination				Credits
				Theory	Practical	Duration	Theory/ Practical	IA Max Marks	Total Marks	
1.	17TX41	Textile Fibre Physics	Textile / Silk	04	--	03	60	40	100	4
2.	17TX42	Manufactured Fibre Technology	Textile / Silk	04	--	03	60	40	100	4
3.	17TX43	Spinning Technology -II	Textile / Silk	04	--	03	60	40	100	3
4.	17TX44	Fabric Manufacturing Technology-II	Textile / Silk	04	--	03	60	40	100	4
5.	17TX45	Chemical Processing of Textiles-II	Textile / Silk	04	--	03	60	40	100	4
6.	17TXL46	Spinning Technology Lab-II	Textile / Silk	-	03	03	60	40	100	2
7.	17TXL47	Fabric Manufacturing Technology Lab-II	Textile / Silk	--	03	03	60	40	100	2
8.	17TXL48	Chemical Processing of Textiles Lab - II	Textile / Silk	--	03	03	60	40	100	2
9.	17KL/CPH 39/49	Kannada/Constitution of India, Professional Ethics and Human Rights	Humanities	01	--	01	30	20	50	1
		TOTAL		**20**	**09**	**24**	**480**	**320**	**800**	**26**

B.Tech. (Textile Technology)
[Common to B.Tech (Textile/Silk Technology)]

V SEMESTER

Sl. No	Subject Code	Title	Teaching Hours / Week		Examination				Credits
			Theory	Practical	Duration	Theory/ Practical Marks	I.A. Marks	Total Marks	
1	17TX51	Management and Entrepreneurship	04	--	03	60	40	100	4
2	17TX52	Spinning Technology-III	04	--	03	60	40	100	4
3	17TX53	Fabric Manufacturing Technology-III	04	--	03	60	40	100	4
4	17TX54	Chemical Processing of Textiles-III	04	--	03	60	40	100	4
5	17TX55X	**Professional Elective**	04	--	03	60	40	100	4
6	17TXL56	Spinning Technology Lab-III		1I+2P	03	60	40	100	2
7	17TXL57	Fabric Manufacturing Technology Lab-III		1I+2P	03	60	40	100	2
8	17TXL58	Chemical Processing of Textiles Lab-III		1I+2P	03	60	40	100	2
		TOTAL	**20**	**06**	**24**	**480**	**320**	**800**	**26**

Professional Elective	
17TX551	Knitting Technology
17TX552	Textile Mechanics and Calculations
17TX553	Erection and Maintenance of Textile Machinery
17TX554	Nano Textiles

1. Core subject: This is the course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

2. Professional Elective: Elective relevant to chosen specialization/ branch

B.Tech. (Textile Technology)
[Common to B.Tech. (Textile/Silk Technology)]

VI SEMESTER

Sl. No	Subject Code	Title	Teaching Hours /Week		Examination				Credits
			Theory	Practical	Duration	Theory/ Practical Marks	I.A. Marks	Total Marks	
1	17TX61	Sericulture and Silk Technology	04	--	03	60	40	100	4
2	17TX62	Textile Testing - I	04	--	03	60	40	100	4
3	17TX63	Fashion Design and Garment Manufacture	04	--	03	60	40	100	4
4	17TX64	Fabric Structure and Design - I	04	--	03	60	40	100	4
5	17TX65X	**Professional Elective**	04	--	03	60	40	100	4
6	17TXL66	Textile Testing Lab - I	--	1I+2P	03	60	40	100	2
7	17TXL67	Fashion Design and Garment Manufacture Lab	--	1I+2P	03	60	40	100	2
8	17TXL68	Fabric Structure and Design Lab - I	--	1I+2P	03	60	40	100	2
		TOTAL	**20**	**6**	**24**	**480**	**320**	**480**	**320**

Professional Elective	
17TX651	Operations Research Techniques
17TX652	Environmental Management in Textile Industry
17TX653	Non-woven Technology
17TX654	Process Control in Weaving

1. Core subject: This is the course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

2. Professional Elective: Elective relevant to chosen specialization/ branch

B.Tech. (Textile Technology)

VII SEMESTER

Sl. No	Subject Code	Title	Teaching Hours /Week		Examination				Credits
			Theory	Practical	Duration	Theory/ Practical Marks	I.A. Marks	Total Marks	
1	17TX71	Apparel Marketing and Merchandising	04		03	60	40	100	4
2	17TX72	Textile Testing - II	04		03	60	40	100	4
3	17TX73	Fabric Structure and Design - II	04		03	60	40	100	4
4	17TX74X	**Professional Elective - I**	03		03	60	40	100	3
5	17TX75X	**Professional Elective - II**	03		03	60	40	100	3
6	17TXL76	Textile Testing Lab - II		1I+2P	03	60	40	100	2
7	17TXL77	Fabric Structure and Design Lab - II		1I+2P	03	60	40	100	2
8	17TXP78	Project Phase - I + Seminar		-		-	100	100	2
		TOTAL	**18**	**6**	**21**	**420**	**380**	**800**	**24**

Professional Elective-I		Professional Elective-II	
17TX741	Statistical Applications to Textiles	17TX751	Total Quality Management
17TX742	Financial Management	17TX752	Retail Management
17TX743	CAD/CAM in Textiles	17TX753	Industrial Engineering
17TX744	Smart Textiles	17TX754	Elementary Mechanics of Textile Structures

1. Core subject: This is the course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

2. Professional Elective: Elective relevant to chosen specialization/ branch

3. Project Phase –I + Seminar: Literature Survey, Problem Identification, objectives and Methodology. Submission of synopsis and seminar.

B.Tech. (Textile Technology)

Sl. No	Subject Code	Title	Teaching Hours /Week		Examination				Credits
			Theory	Practical	Duration	Theory/ Practical Marks	I.A. Marks	Total Marks	
1	17TX81	Apparel Testing and Quality Control	4	-	3	60	40	100	4
2	17TX82	Technical Textiles	4	-	3	60	40	100	4
3	17TX83X	**Professional Elective**	3	-	3	60	40	100	3
4	17TX84	**Internship / Professional Practice**	Industry Oriented		3	50	50	100	2
5	17TXP85	Project Work Phase -II	-	6	3	100	100	200	6
6	17TXS86	Seminar	-	4	-	-	100	100	1
		TOTAL	**11**	**10**	**17**	**330**	**370**	**700**	**20**

Professional Elective	
17TX831	Fibre Reinforced Composites
17TX832	Human Resource Management
17TX833	Clothing Culture and Communication
17TX834	Global Trade Practices

1. Core subject: This is the course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

2. Professional Elective: Elective relevant to chosen specialization/ branch

3. Internship / Professional Practice: To be carried for 4 weeks between the 6th and 7th semester vacation or 7th and 8th semester vacation period.

SEMESTER - III

TEXTILE POLYMER SCIENCE
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - III

Subject Code	17TX31	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES:

1. As the basic building block of all textile products is polymers, acquiring knowledge in this subject is necessary for all undergraduate Textile Technology students.

2. This subject deals with basics of polymer science & Technology, general aspects of polymer production, polymer flow behavior and polymer properties with emphasis given to polymer used for production of textile products.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Introduction and definition of monomers and polymers. History and Classification of polymers. Characteristics of fibre forming polymers and their general applications. Study of synthesis of polymers by chain, step and co-ordination polymerization. Study of various types of initiators for addition polymerization. Comparison of different types of polymerization methods.	**11Hrs**	L1, L2, L3
MODULE 2: Co-polymerization - Concept of co-polymerization, reactivity ratios in Co-polymerization. Kinetics of polymerization - estimation of kinetic chain length, illustration of effect of various parameters on kinetics of polymerization. Functionality in polymers. Carothers equation and extent of polymerization. Techniques of polymerization, comparison of various Techniques.	**10Hrs**	L1, L2, L3
MODULE 3: Rheology of polymers - Define Newtonian and non-Newtonian Fluids. Basic equations related to fluid flow, capillary flow. Characteristics of polymeric solutions. Thermo dynamics of polymer solutions. Analysis of Mechanical and tensile behaviour of polymers. Time dependent mechanical and temperature dependent mechanical behavior. Study of Maxwel's, Kelvin's & Burger's Models.	**11Hrs**	L1, L2, L3,L4
MODULE 4: Concepts of avg. molecular weight and molecular weight distribution. Determination of molecular weight of polymers using end group analysis, osmometry, viscometry and gel permeation chromatography. Importance of molecular weight. Molecular weight differences for fibers & plastics.	**10Hrs**	L1, L2, L3

MODULE 5: Chemistry of polymer degradation - various types of degradation - oxidative, mechanical, Photo and thermal degradation. Use of Inhibitors and anti-oxidants to control polymer degradation. Thermal analysis of polymers - glass transition temperature of polymers. Determination of glass transition temperature. Free volume concept. Study of thermal characterization by DSC, DTA, TGA and TMA	**10Hrs**	L2, L3,L4

Graduate Attributes (as per NBA)
  ➢ **Engineering Knowledge**
  ➢ **Problem Analysis**
  ➢ **Design/development of solutions (partly)**
  ➢ **Interpretation of data**

COURSE OUTCOME:

1. Students will acquire knowledge in basic concepts of polymer Technology with special reference to Textile polymers.
2. After acquiring knowledge in this subject, the students will be able to work in polymer production industry and research laboratory.

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY marks** each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Text book of polymer Science**, Billmeyer.W., Wiley Int.Sc. New York 1984.
2. **Polymer Science,** Gowarikar V.R., Vishwanathan N.V., Jayadev Sridhara, Wiley Eastern Ltd., New Delhi, 1995.
3. **Principles of polymerization,** Odian G., John Wiley & sons, NY, 1976.
4. **Mechanical properties of polymers,** Ward I.M. John Wiley & sons, NY, 1971.

References:
1. **Properties and structure of polymers,** Tobolski, John Wiley & sons, NY, 1960.
2. **Mechanical Properties of polymers,** Nielson L.E., Marshal Dekkar, NY, 1974.
3. **Polymer characterization**, Cambel and White, Chapman& Hall, London.

TEXTILE FIBRES [As Per Choice Based Credit System (CBCS) Scheme] **SEMESTER - III**			
Subject Code	17TX32	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 04			
COURSE OBJECTIVES : The course will enable students to: 1. Recall, Recognize & Analyze the basic textile fibres. 2. Recall, Recognize & Analyze, plan basics of textile fibre and are introduced with different types of natural and manmade (regenerated) fibres. Origin, History, properties and various aspects of textile fibres are taught in this subject.			
MODULES		Teaching Hours	Revised Bloom's Taxonomy (RBT) Level

MODULE 1: Brief history on origin of textiles. Introduction to textile fibres and essential requirements of textile fibres. Classification of textile fibres. Cotton fibres – Origin, History, Cultivation, Grading of cotton fibre, Physical and Chemical properties of cotton fibres	**11Hrs**	L1, L2,L3
MODULE 2: Protein fibres: - Introduction to natural protein fibres. Study of life cycle of Silk worm. Extraction of silk fibre, properties of silk fibre, Special features of silk fibre, Different verities of silk yarns and brief introduction to wild silk, Wool – origin, different types of wool, grading of wool, properties of wool fibres	**10Hrs**	L1, L2,L3
MODULE 3: Bast fibres – Introduction, Types of bast fibres, Method of extraction of bast fibres, Physical & Chemical properties of major bast fibres like Jute, Ramie flax fibres. Introduction to coir, hemp and banana fibres. Flow chart for the conversion of cotton, silk and Wool fibres to yarn and fabric.	**10Hrs**	L1, L2, L3
MODULE 4: Introduction to manufactured fibres. Types of manufactured fibres, comparison of manufactured fibres with natural fibres. Concept of manufactured fibres spinning, Spinnability concept of polymeric fluids. Brief out line on melt, dry and wet spinning. Comparison of these spinning methods. Process variables in melt spinning. Instabilities in melt spinning. Speeds of melt spinning. Brief outline on special shaped fibres, micro denier, ultrafine and nanofibres. Spin finish applications- objectives, formulations and methods of application.	**11Hrs**	L1, L2, L3
MODULE 5: Regenerated fibres - types of regenerated fibres, Chemistry and production of regular Viscose rayon, Di-acetate, Tri acetate, Cuprammonium and Eco-friendly rayon fibres. Studies on modification of viscose rayon. Studies on regenerated Bamboo fibres. India's position in natural and manufactured fibres in global scenario.	**10Hrs**	L1, L2,L3

COURSE OUTCOME: On completion of this course, Students will be able to:
1. Recall & Recognize about fundamentals concepts of textiles products and textile industry.
2. Recognize & Analyze, Apply, the problems associated with the fibres while working in textile industry

Graduate Attributes (as per NBA)
 - ➤ **Engineering Knowledge**
 - ➤ **Problem Analysis**
 - ➤ **Design/development of solutions (partly)**
 - ➤ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY marks** each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Hand book of Textile fibre,** Cook J. Vol.1 & II, Marrow Wat Ford, England.
2. **Textile fibres,** Shenai V.A., Sevak Bombay, 1960.
3. **Manufactured fibre technology,** Gupta V.B, Kothari V.K., Chapman Hall, London, 1997.
4. **Introduction to Textile fibres,** Srinivasa Murthy H.V, T.A.I., Mumbai
5. **Handbook of natural fibres**. Vol.- I R.M.Kozlowski Wood-Head. London- 4012.

References:
1. **Manmade fibre science and Technology,** Mark Atlas, Vol.I& II, Wiley, NT 1967.
2. **Fundamentals of fibre formation,** Ziabicki A. Wiley NY 1976.
3. **Formation of synthetic fibres,** Walczalk.K. Gordon & Sci. London 1977.
4. **High speed fibre spinning,** Ziabicki A. Wiley NY., 1985.
5. **Manmade fibres,** Moncrief R.W. John Wiley and sons, N.Y. 1966.

SPINNING TECHNOLOGY – I
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - III

Subject Code	17TX33	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :
The objective of this Course is to describe the basic spinning processes in Textile Industry and to understand the various spinning operations such as Blow Room, Carding. Students acquire theoretical knowledge about the machineries used

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Importance and need of Ginning. Explanation of working of different types of gins. Defects, causes and remedies of ginning. Baling process and bale weights Identification of important cotton growing countries. Impurities in the cotton and remedies to minimize impurities in cotton. Important cotton types and trash in those cottons. Evaluation of cotton grades._ Definition and objects of mixing and blending. Types of blending and common blends. Influence of fibre parameters namely length, fineness, strength, elongation, chemical deposits and neps on spinning performance.	**11Hrs**	L1, L2,L3
MODULE 2: Objects of Blowroom and identification of its components. Types of opening action in blow room. Brief study of bale pluckers and bale grabbers. Study of design features and different types of openers and beaters on the present day Blow room. Modern developments in Blowroom._ Evaluation of Blow room performance - Hank calculation, production and efficiency calculation. Process modification required in blow room to process blends of Polyester/cotton and polyester/viscose. Study of blow room line required for processing different types of blends.	**11Hrs**	L2 ,L4,L3

MODULE 3: Definition and objects of flat card. Study of design features and different types of clothing on licker in, cylinder and doffer and their specifications. Passage of material through revolving flat card. Auto leveller on card and its importance. Types of autoleveller Setting of different parts of card and gauges used for setting.	10Hrs	L1,L2, L3
MODULE 4: Definition of draft in card and study of different types of draft and its calculation. Objects of stripping and grinding and their importance. Modern developments and salient features of modern cards. List out specification of the present day cards.	10Hrs	L1, L2, L3, L4
MODULE 5: Calculation of Hank of sliver, production and efficiency in carding. Study of various quality control studies such as wrapping procedure, cleaning efficiency, Nep removal efficiency and their comparison with standards.	10Hrs	L1,L2, L3,L4

COURSE OUTCOMES:
On completion of this course, Students will be able to
1. Learn the various spinning processes carried
2. Gain knowledge about the machinery and Process Parameters of Blow room and Carding
3. Will be able to define the basics of spinning Technology

Graduate Attributes (as per NBA)
  ➢ **Engineering Knowledge**
  ➢ **Problem Analysis**
  ➢ **Design/development of solutions (partly)**
  ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY marks** each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Manual of Cotton Spinning**, Coulson. A.F.W. (Ed.), Vol. I to IV, Textiles Institute, Manchester, 1958.
2. **Series on Textile processing,** Zaloski. S. Tp - Institute of Textiles Technology USA Vol.I (Opening, Cleaning and Picking).
3. **Technology of short-staple spinning,** Klein. W., Vol.I, II, III and IV, Textile Institute Pub., Manchester 1989.
4. **Spun Yarn Technology,** Oxtoby, Butterworths, London, 1987.

References:
1. **Contemporary Textile Engineering,** Happey. F. (Ed.) Academic Press Inc., 1981.
2. **Hand book of Cotton Spinning,** William Taggart., UniversalPubl corp. 1979.
3. **Essential Facts of Practical Cotton Spinning**, Pattabhiraman. T.K., Soumya Pub., Bombay 1979.
4. **Cotton Spinning Calculations**, Pattabhiraman. T.K., Soumya Pub., Bombay 1979.
5. **Cotton Opening & Carding,** Merril G.R., Pub: G.R. Merill, Lowell Mass, 1955.
6. **Blowroom and carding** NCUTE Pilot programme.

FABRIC MANUFACTURING TECHNOLOGY – I			
[As Per Choice Based Credit System (CBCS) Scheme]			
SEMESTER - III			
Subject Code	17TX34	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 04			

COURSE OBJECTIVES :
- Recall & Recognize warp & weft preparation
- Recognize &Demonstrate Principles of winding Techniques, yarn clearers, tensioning devices and settings features of autoconers.
- Recall & Recognize & Demonstrate Systems of warping :, size formulations cooking m/c, Weft preparation, pirn winding m/cs
- Define, Recognize & Demonstrate Sizing Ingredients, size controls in sow box etc.
- Recognize, apply & analyze Modern concepts of sizing
- Recognize & Demonstrate Post sizing operations.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Necessity and sequence of operations in warp and weft preparation. Different types of supply and end packages. Objects and principles of winding. Classification of winding machines. Derivation of expression to find winding speed and surface speed, cone angle, coil angle and angle of wind and their importance. Types of balloon breakers. Yarn clearers and tensioning devices. Different types and their settings, gain, knot factor, clearing efficiency.	**10Hrs**	L1, L2
MODULE 2: Uster classimat and its usefulness in selecting optimum clearing. Classification of auto winding machines. Different types of auto winding machines. Salient features of Autoconer, Uniconer, Schlrofhast B.C Spooler etc. Winding faults - causes and remedies. Identification of cones, material handling, measurement of package density.	**10Hrs**	L1, L2
MODULE 3: Objects and systems of warping. Study of different types of modern creels. Study of modern friction driven and spindle driven beam warping machines. Study of different types of sectional warping machines and their salient features. Special warpers for polyolefin filament yarns. Special requirements of yarn preparatory for shuttleless weaving machines. Production calculation of all machines. Introduction to weft preparation/spindle & spindleless weft winders. Study of different types of weft winding machines. Unifil loom winders/ Bobbin loaders	**11Hrs**	L1, L2, L3,
MODULE 4:	**10Hrs**	L1, L2, L3, L4

Objects of sizing. Study of Ingredients used for size preparation. Size formulation, study of mixing vessels such as pressure cookers, injection cookers, homogenizers, agitators and storing becks. Techniques of sizing, types of Sizing. Sizing recipes for natural fibres, man-made fibres and their blends. Salient features of modern sizing machines, creels and sow box.		
MODULE 5: Drying principles – multi-cylinder drying, hot air drying, radiation drying. Size pickup, size add on. Concept of single-end sizing. Head stock - dry splitting, comb, drag roll. After waxing, cut mark motion, beam pressing. Controls in sow box - stretch and its control, moisture measurement and temperature control. Recent trends in sizing i.e. foam sizing, solvent sizing, hot melt sizing. High pressure squeezing, migrating behavior of warp ends, dead loss, hard waste. Lappers, size defects and remedies. Post sizing operations - Drawing-in, leasing, knotting, automatic drawing in machine, gaiting-in technique.	**11Hrs**	L2, L3, L4

COURSE OUTCOME :
- Recall & Recognize the necessity of warp & weft preparation
- Recall & Recognize &Demonstrate Winding operation, accessories of winding settings
- Recognize, Demonstrate& Analyze Winding m/cs their working features auto-winding machines
- Recognize & Demonstrate Warping m/c, different types, and different creels.
- Recognize, Demonstrate & Analyze Sizing concepts ingredients size cooking M/c, Saw box drying principles controls
- Recall & Recognize & Analyze Post sizing operations.

Graduate Attributes (as per NBA)
- ➢ **Engineering Knowledge**
- ➢ **Problem Analysis**
- ➢ **Design/development of solutions (partly)**
- ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY marks** each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Textile Sizing** by B.C.Goswamy.
2. **"An Introduction to Winding and Warping",** Talukdar M K, Talukdar, Bombay Pvt. Circulation.
3. **"Warp sizing mechanisms"**, Ramsbottom Columbia press, Manchester, 1965.
4. **Weaving tablets,** Textiles Association of India, Bombay,1985.
5. **Yarn preparation,** Sengupta R. –Vol I & II Mahajan Pub. Ahmedabad, 1970.
6. **Modern Preparation and weaving machinery**, Ormerod A. Butterworth publication Co. 1983.

References:
1. **Cotton weaving**, Gordev V and Volkov P, Mir Pub. Moscow 1987.
2. **Automatic Weaving**, Aitken, Colombia Press, Manchester 1969.
3. **"Sizing Materials, Methods and Machines",** Ajgaonkar D B, Textiles trade press, Bmbay1982.
4. **An Introduction to Automatic weaving**, Bennet G A, Columbia press, Manchester 1958.

CHEMICAL PROCESSING OF TEXTILES – I
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - III

Subject Code	17TX35	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 04			

COURSE OBJECTIVES

 This course aims at updating the knowledge of students in the following fields of chemical processing of textiles

1. Basics of wet processing, sequences.
2. Different preparatory process of singeing, desizing, scouring, bleaching and mercerization.
3. Machineries used for various wet processing activities.
4. Recent advances in wet processing activities.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE – 1 Introduction to processing operations and sequences Chemicals and auxiliaries used for textile wet processing and their functions. Introduction to shearing and cropping. Objects of shearing and cropping. Objects of singeing, methods of singeing, working of various singeing machines, latest developments in singeing	**10Hrs**	L1, L2
MODULE – 2 Various desizing methods, Discussion on desizing - continuous desizing, desizing of cotton and other blends, latest developments in desizing. Objects of scouring, mechanism of scouring, methods of scouring, scouring of natural cellulose fabrics. Degumming of silk**, s**couring of wool and jute, scouring of synthetic fibres. Modifications required to scour knitted fabrics. Latest developments in scouring.	**10Hrs**	L1, L2,L3
MODULE – 3 Objects of bleaching, mechanism of bleaching and methods of bleaching. Bleaching of cellulosic fibres, natural protein fibres, common manufactured fibres and common fibre blends. Latest developments in bleaching. Objects of optical whitening, chemistry of optical whitening agents and optical whitening process for common fibres. Quality control methods for testing scoured and bleached materials and methods used for determination of degradation of cotton, during scouring and bleaching.	**12Hrs**	L1, L2, L3
MODULE – 4 Machines used for desizing, scouring and bleaching. Batch processes, semi continuous processes and continuous processes. Objects of mercerization, history and developments of	**10Hrs**	L1, L2, L3, L4

mercerization, physical and chemical changes in cotton due to mercerization, various factors affecting mercerization, degree or efficiency of mercerization.		
MODULE - 5 Methods of mercerizing yarns and fabrics. Machines used for mercerization, taught and slack mercerization. Principle of hot mercerization. Test methods for mercerized fabrics. Latest developments in mercerization. Brief study on eco-friendly preparatory processes. Water and energy management in preparatory processes.	**10Hrs**	L2, L3,L4

COURSE OUTCOMES
1. **This subject helps the student to acquire knowledge of preparatory process of wet processing and pre preparatory process.**
2. **This subject prepares the student work in chemical processing industry.**
3. **Students are exposed to research field in chemical processing technology.**

Graduate Attributes (as per NBA)
➢ **Engineering Knowledge**
➢ **Problem Analysis**
➢ **Design/development of solutions (partly)**
➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY marks** each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

TEXT BOOKS:
1. **Technology of Textile Processing-** Vol. III, V A Shenai, 1975, Sevak Publications
2. **Technology of Bleaching and Dyeing of textile fibres** - Chakraborthy, 1972, Coxtown publications
3. **Mercerization-** J T Marsh, 1979, B I Publications.
4. **Scouring and Bleaching of Cotton**- J.T. Marsh, 1979, B I Publications.
5. **Dyeing and Chemical Technology of textile Fibres-** E.R.Trotman,

REFERENCE BOOKS:
1. **Chemical Technology of Fibrous Materials-** MIR Publications, 1978.
2. **Textile Auxiliaries and Finishing Chemicals-** ATIRA Publications.1975
3. **Textile Chemistry-**Vo. I, II and III R H Peters, Elsewhere Publishing Co. New York.
4. **Modern techniques of textile Bleaching**- Dyeing, and Finishing, SITRA Publication.
5. **Chemical Processing of Cotton, Polyester Cotton Blends**- J.R.Modi and A.R. Garde, 1960, TAI Publications.
6. **Recent processes of Textile Bleaching, Dyeing and Finishing**- S B Srivastava, 1978, SBP Publications.

SPINNING TECHNOLOGY LAB-I
[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – III

Laboratory Code	17TXL36	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam marks	60
		Exam Hours	03
CREDITS – 02			

Course Objectives

The objective of this Course is to describe the basic Practical spinning process of Textile Machineries such as Blow Room, Carding. Students acquire the practical knowledge about the machineries used

Laboratory Experiments: NOTE: The experiments are to be carried using discrete components only.	Revised Bloom's Taxonomy (RBT) Level
Blow Room: 1. Passage of material through the blow room and different openers and beaters of blow room. Selection of beater points and study of their design features and to evaluate their efficiencies.	L2, L3, L4
2. Driving arrangements and demonstration of all machineries and calculations of speeds of different parts of each machineries	L2, L3, L4
3. Calculation of cleaning efficiency at all beaters and openers.	L2, L3, L4
4. Study of piano feed regulating motion and calculation of cone drum speed, feed roller speed and beats/inch.	L4
5. Production and CV% calculation in Blow Room laps (within and between).	L4
6. Identification of Blow Room process for different mixings, impurities and counts.	L2
Carding: 7. Explanation of Passage of material through revolving flat card.	L2
8. Speed and draft calculation of different parts of carding with the help of gearing and driving arrangement.	L4
9. Draft constant and its calculation.	L4
10. Draft change pinion calculation and machine operation to get different hank of slivers.	L3
11. Calculation on snap study to analyze neps, sliver variations and efficiency.	L4, L5
12. Settings of different parts and gauges used setup the machines.	L3, L4

13. Comparison between conventional and modern high speed card with respect to production, efficiency and quality of sliver.	**L4 ,L5**
14. Hank and CV calculation of sliver.	**L4**

Course Outcome

On completion of this course, Students will be able to

1. Learn the practical aspects of the machineries used
2. Gain knowledge about the process parameters such as Settings, Speeds of Blow room and Carding

3. Will be able to define the actual running of the machineries

Graduate Attributes (as per NBA)

- Engineering Knowledge.
- Problem Analysis.
- Design/Development of solutions.

Conduct of Practical Examination:

1. All laboratory experiments are to be included for practical examination.

2. Students are allowed to pick one/two experiment from the lot.

3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.

4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

FABRIC MANUFACTURING TECHNOLOGY LAB-I [As per Choice Based Credit System (CBCS) scheme]			
SEMESTER – III			
Laboratory Code	17TXL37	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03
CREDITS – 02			

COURSE OBJECTIVES :
- Recall & Recognize the features passage, production calculation & efficiency of hank winding m/c, cone winding m/c.
- Recall, Recognize & Analyze the non-auto& auto pirn winding, bunch building production and efficiency calculations
- Recognize & Demonstrate Production and efficiency warping machines like Beam and sectional warping machines.
- Recall, Recognize Sizing machine: passage through sow box drying equipment's, head stock
- Recall, Recognize Weft preparation auto & non-auto winding m/c.
- Recognize & Demonstrate & Calculate Production and efficiency calculations.
- Recognize & Demonstrate Drawing - in and denting operations.

Laboratory Experiments: **NOTE: The experiments are to be carried using discrete components only.**	**Revised Bloom's Taxonomy (RBT) Level**
1. Passage of material through hank winding machine Speed, production and efficiency calculations	**L1, L2,L4**
2. Working on double flanged bobbin winder. Speed, production and efficiency calculations of double flanged winding machine.	**L2, L3, L4**
3. Passage of material through non-automatic and automatic winding machines. Study of the salient features, speed, production and efficiency calculations.	**L1, L2, L4**
4. Setting of Tensioners and Slub catchers on winding machine.	**L3, L5**
5. Passage of material through non-auto pirn winding machine. Adjusting the bunch length, speed, production and efficiency calculations.	**L2, L3,L4,L5**
6. Passage of material through automatic pirn winding machine. Adjusting the bunch length, speed, production and efficiency calculations.	**L2, L3, L4**
7. Passage of material through sectional warping machine. Calculation of machine particulars and production.	**L2,L4, L5**
8. Passage of material through Beam warping machine. Calculations related to speed, production and efficiency.	**L2, L3, L4**
9. Passage of material through sizing machine. Calculations related to speed, production and efficiency.	**L2, L3, L4**
10. Plan of warp patterns for stripes and check fabrics.	**L3,L5, L6**
11. Preparation of warp on sectional warping machine and related calculations.	**L4,L5**
12. Study of different types of sizing ingredients, cooking and mixing beck.	**L1,L2,L3**

13. Knotting, drawing - in and denting of weavers beam.	**L3,L4**
14. Identification, reasons and remedies for defects in pirn winding, warping and sizing.	**L2,L4, L5**

COURSE OUTCOME : On completion of this laboratory course, Students will be able to
- Recognize & Demonstrate working of yarn preparatory machines like hank winding, cone winding warping and weft winding machines:
- Recognize, apply & calculate the production and efficiency of preparatory machines.
- Recognize & Demonstrate Sizing machine construction & working, drying of warp and head stock
- Recognize, apply& Demonstrate Drawing - in and denting operations, gaiting techniques.

Graduate Attributes (as per NBA)
- Engineering Knowledge.
- Problem Analysis.
- Design/Development of solutions.

Conduct of Practical Examination:
1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one/two experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

CHEMICAL PROCESSING OF TEXTILES			
LAB-I			
[As per Choice Based Credit System (CBCS) scheme]			
SEMESTER – III			
Laboratory Code	17TXL38	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03
CREDITS – 02			

Course Objectives:

1. This subject aims to acquire knowledge of various chemical preparatory process of textiles.
2. Practical knowledge on preparatory process bring more confidence in students and they are exposed to different machineries, recipes and process control.
3. Knowledge on recent developments, ecofriendly process.

Laboratory Experiments: NOTE: The experiments are to be carried using discrete components only.	Revised Bloom's Taxonomy (RBT) Level
1. Desizing of cotton yarn/fabric using acids.	**L5, L6**
2. Desizing of cotton yarn/fabric using enzymes (amylases).	**L2, L3, L4**
3. Scouring of cotton using alkali method and determination of scouring loss.	**L2, L3, L4**
4. Degumming of silk using soap-soda/enzymatic methods and determination of degumming loss.	**L2, L3, L4**
5. Scouring of Wool fibres and determination of scouring loss	**L2, L3, L4**
6. Scouring of Jute fibres determination of scouring loss	**L2, L3, L4**
7. Bleaching of cotton using bleaching powder and Sodium hypochlorite	**L4, L5**
8. Bleaching of cotton using Hydrogen Peroxide.	**L2, L3, L4**
9. Bleaching of silk and woolen goods.	**L2, L3, L4**
10. Bleaching of Jute fibres/fabrics.	**L4, L5**
11. Optical whitening of bleached goods.	**L4, L5**
12. Mercerization of cotton in taught and slack forms	**L4, L5**
13 Determination of scouring/bleaching efficiency using cuprammonium fluidity, methylene blue absorption etc	**L4, L5**
14. Determination of efficiency of mercerized goods using BAN and strength measurements.	**L3, L4, L5**

Course Outcomes:

1. This course helps the students to acquire practical knowledge of various chemical preparatory process.
2. Students are exposed to process control, chemicals and auxiliaries used, machineries.
3. This subject prepare the students work in various chemical industries.

Graduate Attributes (as per NBA)
- Engineering Knowledge.
- Problem Analysis.
- Design/Development of solutions.

Conduct of Practical Examination:

1. All laboratory experiments are to be included for practical examination.

2. Students are allowed to pick one experiment from the lot.

3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.

4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

SEMESTER - IV

TEXTILE FIBRE PHYSICS
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - IV

Subject Code	17TX41	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :
This course aims at updating the knowledge of students in the following fields of fiber physics:
1. Basic concepts of fiber structure, properties and investigation of fiber structure
2. Basic concepts various mechanical, thermal, moisture, optical, electrical and frictional behavior of fibers.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE - 1 Introduction to structure of fibers. Approaches to polymer fiber structure. List of parameters for reasonable specification of fiber structure analysis of solid state structure of textile fibres using DGC, X-rays, IRS, NMR, SEM and TEM. Study of two phase and one phase model of fibre physical structure	**11Hrs**	L1, L2, L4
MODULE - 2: Discussion on descriptive studies on of physical structure of Cotton, Wool, Silk, PET, Nylon and Acrylic fibres. Moisture relations: Concept of moisture equilibrium, moisture hysteresis, moisture regain, heat of absorption, swelling of textile fibres. Effect of moisture on various properties of fibres. Calculations of Mr and Mc of fibres.	**10Hrs**	L1, L2,L4
MODULE - 3 Mechanical properties: Analysis of Stress and strain behaviour, Expression of results of tensile properties, factors affecting tensile behaviour, structure and tensile property correlation, Elastic recovery and weak-link effect. Stress relaxation, creep, factors affecting stress relaxation and creep. Dynamic mechanical properties and their applications.	**11Hrs**	L1, L2, L3,L4
MODULE - 4 Directional effects- Bending of fibers, Twisting of fibers, Shear modulus, Shear stresses and compression fiber masses. Frictional properties, Amonton's laws of friction, deviation of these laws in fibre friction. Nature of fiber friction, the friction of wool fibers	**10Hrs**	L1, L2, L3

MODULE - 5	10Hrs	L1,L2, L3
Introduction of Optical properties, measurement of birefringence, luster. Importance of optical properties Electrical properties: Electrical resistance, static electricity, dielectric properties and measurement of these properties. Thermal properties: Thermal conductivity, specific heat, thermal expansion and directional dependence of these thermal properties.		

COURSE OUTCOME
1. This course work prepares students to face problems related to fiber behavior in various fields of textiles viz; Spinning, Weaving, Chemical processing and Garmenting.
2. As this subject deals with most fundamental aspects of textiles (fibers), in-depth knowledge in this subject helps in carrying out any kind of research in textile and allied fields.

Graduate Attributes (as per NBA)
  ➢ **Engineering Knowledge**
  ➢ **Problem Analysis**
  ➢ **Design/development of solutions (partly)**
  ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY marks** each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Book:
1. **Physical properties of Textile fibres,** Morton & Hearle, J.W.S., TI, London, 4008.
2. **Manufactured fibre technology,** V.B.Gupta and Kotari V.K., Chapman & Hall, London.
3. **Mechanical properties of polymers,** Ward I.M., John wiley & sons, NY 1971.

References:
1. **Mechanical properties of polymer,** Neilson L.E., VolI,II, III, Marcel Dekkar, NY, 1974.
2 **Polymer Characterization,** Cambel and White, Chapman & Hall, London 1989.
3. **Moisture relations in textiles,** Hearle J.W.S., Textile Institute, London.

MANUFACTURED FIBRE TECHNOLOGY
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - IV

Subject Code	17TX42	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES
This course aims at updating the knowledge of students in the following fields of
 manufactured fibre technology:
   1. Fundamental aspects of synthetic fiber and production of commodity fibers like PET, Nylon, PT and PAN,
   2. Studies on various high performance fibers
   3. Post spinning operations in manufactured fibers and recent advances in manufactured fibers.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level

MODULE - 1 Introduction to synthetic fibres. List of synthetic fibres. Raw materials for production of PET. Study of production of PET by DMT & TPA routes - study of side reactions, degradation reactions during PET production. Description of Modification of PET fibres. Polypropylene fibres- production, use of various types of catalysts for Production of PP. Summary of properties of PET and PP fibres.	11Hrs	L1, L2
MODULE - 2 List of **Polyamide fibres**, Discussion on Production of polyamides, nylon-6 study of semi-continuous & integrated continuous process for Production of nylon-6, Production of nylon-66. Composition of N6-N66 production. Modification of nylon fibres. PAN fibers – introduction, Types, Different methods of Production of PAN polymer & Spinning of PAN fibers. **Elastomeric fibres-** origin, definition and production details.	10Hrs	L1, L2, L3
MODULE - 3 Introduction to high performance fibres. Classification of high performance fibres. Study of production of carbon, boron, silicon carbide, alumina & glass fibres. Study of Production of UHMWHDPE by GEL Spinning. Composites of various high performance fibres. Comparison of cut and stretch method.	10Hrs	L1, L2, L3
MODULE - 4 Define LCPS, Types of LCPS. Study of Production of aromatic polyamides viz. Nomex, Kevlar. Concept of liquid crystal, thermotropic & leotropic polymers fibres. Production and properties of PBZT and PBZO and aromatic polyester fibres. Study of drawing & heat setting of fibres. Study of tow to top conversion. Cut method, stretch – breaking method.	11Hrs	L1, L2, L3
MODULE - 5 Need for texturing, Define texturing. Introduction to texturing. Study of different methods of texturing. False twist, draw texturing, Study of various parameters affecting false twist texturing. Airjet texturing, stuffer box crimping. Knife edge crimping, knit-de-knit crimping. Solvent texturing. Analysis of crimp rigidity. Physical bulk & instability of textured yarns.	10Hrs	L1, L2, L3, L4

COURSE OUTCOME
1. This subject helps the students to acquire knowledge of synthetic fibres.
2. This subject prepares the students work in manufactured fiber plants in India and Abroad.
3. Subject also prepares and motivates the students to take up research work in field of manufactured fiber technology and technical textiles.
4. Students will be able to analyze characteristics of textured yarns.

Graduate Attributes (as per NBA)
  ➢ **Engineering Knowledge**
  ➢ **Problem Analysis**
  ➢ **Design/development of solutions (partly)**
  ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY marks** each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **High Performance fibres**, J.W.S.Hearle, Wood Head, UK-4005.
2. **Synthetic fibres**- J.E.McIntyre, J.W.S.Hearle, Wood Head, UK-1999.
3. **Manufactured fibre technology,** V.B.Gupta, Kotari V.K., Chapman & Hall, London, 1997.
4. **Production of synthetic fibres,** Vaidya A. Prantice Hall, New Delhi, 1985.
5. **Textile yarns,** Goswamy B.C., Wiley and Sons, NY 1960.

References:
1. **Manmade fibres,** Moncrief R.W., Wiley, NY 1975.
2. **Manmade fibre science and technology,** Mark Atlas, Vol.II and III, Wiley Intr.Sc. NT, 1967.
3. **New fibres,** T.Hongu, Ellis Horwood, Newyork, 1990.
4. **Hand book of fibre Science and Technology**, Levin, E.M.Pearce, J.Preston, Vol-3, Vol-4, Marcel Dekkar, New York, 1989
5. **Carbon fibres,** Donnet J.B., Bansol R.C., Marcel Dekkar, New York, 1990

SPINNING TECHNOLOGY – II [As Per Choice Based Credit System (CBCS) Scheme] **SEMESTER - IV**			
Subject Code	17TX43	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 04			

COURSE OBJECTIVES

      The objective of this Course is to explain the students the basic spinning process in Textile Industry such as Draw Frame, Comber and Speed frame. Students will acquire theoretical knowledge about the machineries used.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE - 1 Objects and principle of draw frame. Study of different drafting systems through sketches and name the types of draft in the drafting zone. Types of loading systems. Roller setting and procedure of roller setting. Auto levelers on drawframe. Study of long and short creel draw frames and their advantages and limitations. Brief study on bercolisation, scouring, buffing, roller eccentricity, shore hardness, calculations of draw frame such as production and efficiency.	**11Hrs**	L1, L2,L4
MODULE - 2 Modern developments in draw frame and specifications of the present day draw frame. Various quality control studies of draw frame such as wrapping procedure, Hank of sliver and coefficient of variation. Determine Hook theory and preparatory processes to comber. Objects of combing and study of combing cycle with the help of sketches and also index numbers. Detachment setting and its importance. Gauges used for setting the comber. Calculations in comber.	**11Hrs**	L1, L2
MODULE - 3 Various quality control studies of comber. Neps removal efficiency etc. Modern developments at comber and salient features of the present day comber. Objects of speed frame, study of different drafting systems and importance of apron drafting system. Principle of twisting and winding in speed frame.	**10Hrs**	L1, L2, L3
MODULE - 4 Study of different types of flyers, building mechanism, lift, chase length and their importance. Study of differential gearing mechanism and its importance. Different types of change points at speed frame.	**10Hrs**	L1, L2, L3, L4
MODULE - 5 Modern developments in speed frame and salient features of the modern speed frame. Study of various quality control studies such as hand determination, coefficient of variation. Calculations in speed frame.	**10Hrs**	L2, L3

Course Outcome

On completion of this course, Students will be able to

1.Learn the various spinning processes carried

2.Gain knowledge about the machinery and Process Parameters of Draw Frame, Comber and Speed Frame

3. Will be able to describe the basics of spinning Technology

Graduate Attributes (as per NBA)
➢ **Engineering Knowledge**
➢ **Problem Analysis**
➢ **Design/development of solutions (partly)**
➢ **Interpretation of data**

Scheme of Examination / Question paper pattern

• Two full questions (with a maximum of four sub questions) of **TWENTY marks** each to be set from each module. Each question should cover all contents of the respective module.

• Students have to answer five full questions choosing one full question from each module

Text Books:

1. **Manual of Cotton Spinning,** Coulson. A.F.W.(Ed.), Vol. I to IV. Textile Institute, Manchester, 1958.

2. **Series on Textile processing,** Zaloski.S., The Institute of Textile Technology, USA, Vol.I. (Opening, cleaning and picking).

3. **Technology of short-staple spinning**, Klein.W.,Vol.I, II, III and IV, Textile Institute Pub., Manchester 1989.

4. **Spun Yarn Technology,** Oxtoby, Butterworths, London. 1987.

References:

1. **Contemporary Textile Engineering,** Happy. F. (Ed.), Academic Press, Inc., 1981.

2. **Hand Book of Cotton Spinning,** Taggart William, Universal Pub. Cor.,1979.

3. **Essential Facts of Practical cotton spinning**, Pattabhiraman T.K., Soumya Pub., Bombay, 1979.

4. **Cotton Spinning Calculation**, Soumya Pub., Bombay - 1979.

5. **Cotton Opening & Carding,** Merril. G.R., Pub. G.R. Merril, Lowell Mass, 1955.

6. **Draw frame, comber, speed frame** - NCUTE Pilot programme.

FABRIC MANUFACTURING TECHNOLOGY – II
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - IV

Subject Code	17TX44	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES:

• Define, Recognize & analyze The principles of weaving motions are the basics for the production of fabrics of all types

• Recognize, Demonstrate & analyze basic of weaving mechanisms. the basic concepts of looms, nomenclature of weaving terms, constructions & working of various motions settings & timings etc.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE - 1 Introduction to Hand looms, power looms, automatic looms and shuttle less looms. Nomenclature of weaving terms. Basic motions in weaving. Shedding - Different types of shed. Positive and negative tappet shedding. Heald reversing mechanism. Staggering of healds, tappet shedding and their characteristics. Different types of tappets. Merits and demerits of tappet shedding, timing, setting, early and late shedding. Study of different types of reed, reed count. healds, heald count.	**11Hrs**	L1, L2

MODULE - 2 Picking - Objectives of picking. Methods of picking, essentials of good picking, picking accessories cone over picking mechanisms setting & timings. Early and late picking in negative picking. Timing, setting of picking mechanism. Under picking mechanisms. Bowl and shoe under picking mechanism, side lever under picking mechanisms, side shaft under picking mechanisms, Timings & setting methods to alter the timing & strength of picking mechanism Shuttle checking devices for over & under picking mechanism. Swell mechanism reasons for shuttle trap. Beat-Up- Objects: Crank Beat up. Eccentricity of sley. Factors affecting the sley eccentricity. Cam beat- up mechanism.	**10Hrs**	L1, L2
MODULE - 3 Take up motion - Objects - types of Take up motions Intermittent, continuous Take up motion, 5 wheel take up and 7 wheel take up motions, comparisons and dividend calculations. Continuous worm & warm wheel take up motion, anti-crack motion. Let-off motions – Types of let- off motions and negative let off : Break let off frictional rope or chain lever &wt let off motion construction & working, Positive let off : Basic requirements, advantages, Rapier, Toyoda, Ruti let off mechanisms. Construction & working of electronic let off motion. Different types of back rests.	**10Hrs**	L1, L2, L3, L4
MODULE - 4 Auxiliary Motions- Objects, Necessity & different types. Warp protector motions objects types - loose reed and fast reed. Electromagnetic warp protector - construction & working. Warp stop motions, drop wires – mechanical & electrical type. Weft stop motions - side weft fork and centre weft fork motions. Construction & working comparisons. Warp easing motions loom banging off.	**11Hrs**	L1, L2, L3,
MODULE - 5 Study of temples choice & suitability: Functions different types of temples. Defects caused by temples. Multiple box motions: weft patterning, 2x1, 4x1, 4x4 motions - construction & working. Automatic Looms - Different types - Cop changing, shuttle changing looms, feelers, types of feelers, shuttle eye cutters, temple eye cutters, construction & working. Fabric defects causes & remedies. Filament weaving: Loom modification & requirements. Speed and production calculations of plain looms.	**10Hrs**	L2, L3,L4

COURSE OUTCOME
- Recall & Recognize the fundamentals of weaving different motions.
- Recognize, Demonstrate & Analyze speed & working of different mechanism production calculation of looms.

Graduate Attributes (as per NBA)
➢ **Engineering Knowledge**
➢ **Problem Analysis**
➢ **Design/development of solutions (partly)**
➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY marks** each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
  1) **Principles of weaving mechanism** by Robinson & Marks
  2) **Weaving mechanism**, M.K.Talukdar.
  3) **Weaving Mechanism,** Fox
  4) **Weaving mechanism**, Bannerjee N.N.

Reference:
1. **Weaving tablets,** Textiles Association of India, Bombay, 1985.
2. **Cotton weaving**, Gordev. V and Volkov. P., Mir Pub., Moscow 1987.
3. **Automatic weaving,** Aitken, Colombia press, Manchester 1969.
4. **An Introduction to Automatic weaving,** Bennet G.A. - Colombia press, Manchester 1958.
5. **Modern preparation and weaving machinery,** Ormerod. A., Butterworth publication Co. 1993.

CHEMICAL PROCESSING OF TEXTILES – II
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - IV

Subject Code	17TX45	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

Course Objectives:
- To make students learn and understand the basics and advancements in dyeing processes in textile industry.
- To make the students exposed to various machinery employed for the above processes.
- To understand the chemistry of dyes and dyeing auxiliaries and their potential application for various textile fibre fabrics.
- To enhance the knowledge of students towards computer colour matching concepts, eco-friendly dyeing processes and natural dyes.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE – 1 **Introduction to Textile Dyeing:** Classification of dyes and principles of dyeing. Chemicals and auxiliaries used for textile dyeing and their functions. Chemical constitution of dyes. Effect of fibre structure on dyeing behavior. Theories of dyeing. Action of electrolytes, effect of dye bath temperature, effect of material to liquor ratio, effect of dye bath pH, Modern concepts of dyeing and selection of dyes for specific end uses. Evaluation of fastness properties of dyed materials.	**11Hrs**	L1, L2

MODULE – 2 **Chemistry, properties and application of dyes for Cellulosic fibres:** Direct dyes – Classification, properties, application procedures, after treatments to direct dyed goods. Reactive dyes – Classification, properties, dyeing conditions, application procedures. Vat dyes - Classification, properties, dyeing conditions, application procedures. Sol-vat dyes - Classification, properties, dyeing conditions, application procedures. Sulphur dyes - Classification, properties, dyeing conditions, application procedures. Azoic dyes - Classification, properties, dyeing conditions, application procedures.	**10Hrs**	L1, L2
MODULE – 3 **Chemistry, properties and application of dyes for Protein fibres:** Acid dyes - Classification, properties, dyeing conditions and application procedures. Basic dyes - Classification, properties, dyeing conditions and application procedures. Mordant dyes - Classification, properties, dyeing conditions and application procedures. Metal Complex Dyes - Classification, properties, dyeing conditions and application procedures. Introduction to natural dyes and their methods of application.	**10Hrs**	L1, L2, L3
MODULE – 4 **Chemistry, properties and application of dyes for Synthetic fibres and their blends:** Disperse dyes - Classification, properties, dyeing conditions and application procedures. Modified basic dyes - Classification, properties, dyeing conditions and application procedures. Various after treatments given to synthetic dyed goods. Concepts in dyeing of P/C, P/V and P/W blends	**10Hrs**	L1, L2, L3, L4
MODULE – 5 **Garment Dyeing, Dyeing machinery and Concepts of Colour Matching:** Preparatory process for garment dyeing, specialty chemicals and dyes used for garment dyeing. Different types of dyeing practices for various types of garments, precautions to be taken for effective dyeing of garments. Quality control in garment dyeing and garment dyeing machines. Working principles of dyeing machines for yarns and fabrics such as Winch, Jigger, Jet dyeing machines, HTHP dyeing machines etc. Latest developments in dyeing machinery. Introduction to colour measurement and computer colour matching concepts. Spectrophotometers and determination of K/S value, Yellowness, Whiteness and Brightness indices.	**11Hrs**	L2, L3, L4

COURSE OUTCOMES		

COURSE OUTCOMES

On completion of this course, students will be able to:

- Learn the chemistry of the various dyes and dyeing processes carried out in chemical processing department.
- Gain knowledge about the dyeing machinery involved.
- Understand the recipes used in dyeing of cellulosic, protein, synthetic fibres and blends.
- Exposed to actual mechanisms involved in various dyeing operations and processes carried out in the industry.
- Gain knowledge about latest developments in dyeing, dyes and auxiliaries, natural dyes etc.
- Gain confidence to work in a dye house.

Graduate Attributes (as per NBA)

- ➢ **Engineering Knowledge**
- ➢ **Problem Analysis**
- ➢ **Design/development of solutions (partly)**
- ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern

• Two full questions (with a maximum of four sub questions) of **TWENTY marks** each to be set

from each module. Each question should cover all contents of the respective module.

• Students have to answer five full questions choosing one full question from each module

TEXT BOOKS:

1. **Textile Preparation and Dyeing** – Asim Kumar Roy Choudhury, SDC, India, 4011
2. **Dyeing and Chemical Technology of Textile Fibres** - E.R. Trotman, Wiley, 1985
3. **Fundamentals and Practices in Colouration of Textiles -** J.N. Chakraborty, Woodhead Publishing India Pvt Ltd, 4010
4. **Handbook of Textile and Industrial Dyeing – Volume -1, Principles, processes and types of dyes.** Edited by M Clark – Woodhead Publishing Ltd. 4011
5. **Technology of Dyeing –** Volume - 6 of Technology of textile processing, V AShenai, Sevak Publications, Mumbai, 1984.
6. **Textile dyeing operations: chemistry, equipment, procedures, and environmental aspects -** Shrikant V. Kulkarni, Noyes Publications, 1986
7. **Textile Chemistry, Vol. III –** The physical chemistry of dyeing, R. H. Peters, Elsevier, Amsterdam, The Netherlands, 1975

REFERENCE BOOKS:

1. **Textile Auxiliaries and Finishing Chemicals-** ATIRA Publications.
1. **Modern techniques of textile Bleaching-** Dyeing, and Finishing, SITRA Pub.
2. **Chemical Processing of Cotton, Polyester Cotton Blends**- J.R.Modi and A.R. **Garde -** 1960, TAI Publications.
4. **Dyeing of Polyester Blends**- M L Gulrajani, 1960, TAI Publications.
5. **Principles and practice of Dyeing-** V A Shenai, 1993 Sevak Publications.

SPINNING TECHNOLOGY LAB-II			
[As per Choice Based Credit System (CBCS) scheme]			
SEMESTER – IV			
Laboratory Code	17TXL46	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03
CREDITS – 02			

COURSE OBJECTIVES	
The objective of this Course is to describe the basic Practical spinning process of Textile Machineries such as Draw Frame, Comber and Speed Frame. Students acquire the Practical knowledge about the machineries used.	
Laboratory Experiments: **NOTE: The experiments are to be carried using discrete components only.**	Revised Bloom's Taxonomy (RBT) Level
DRAW FRAME: 1. Passage of material through draw frame and list the parts and their functions.	**L1**
2. Different types of drafting system and describe salient features of modern draw frames	**L2**
3. Break draft, main draft and total draft calculation.	**L4**
4. Production, delivery speed, calculation of hank of sliver, efficiency calculation of draw frame.	**L4, L5**
5. Setting of drafting zone and processing of material as per the hank required.	**L4, L5, L6**
COMBER: 6. Study of preparatory machines to comber. Study of one cycle of combing. Detachment setting and its importance. Setting of comber parts with the help of index numbers.	**L2, L3, L4**
7. Production, speed, efficiency, draft calculation of comber.	**L4**
8. Working on comber. Demonstration of comber working.	**L3**
SPEED FRAME: 9. Passage of material through speed frame. Explain different types of drafting system on speed frame.	**L2**
10. Break draft, main draft, total draft and draft constant calculations. Identification DCP to produce calculation to get different hank of roving on speed frame.	**L2**
11. Spindle speed drafting rollers speed calculations. TPI and twist constant calculations.	**L4**
12. Bobbin speed calculation with the help of differential gear mechanism. Building mechanism	**L4**
13. Production, delivery speed, hank of roving and efficiency calculations of speed frame and their demonstration.	**L3, L4**
14. Explanation of working of speed frame and setting of drafting roller.	**L2, L5**

COURSE OUTCOMES
On completion of this course, Students will be able to:
1. Learn the practical aspects of the machineries used
2. Gain knowledge about the process parameters such as Settings, Speeds of Draw Frame, Comber and Speed Frame
3. Will be able to define the actual running of the machineries

Graduate Attributes (as per NBA)
- Engineering Knowledge.
- Problem Analysis.
- Design/Development of solutions.

Conduct of Practical Examination:

1. All laboratory experiments are to be included for practical examination.

2. Students are allowed to pick one/two experiment from the lot.

3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.

4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

FABRIC MANUFACTURING TECHNOLOGY LAB-II
[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – IV

Laboratory Code	17TXL47	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03

CREDITS – 02

COURSE OBJECTIVES

1. Students are exposed to various motions of weaving and acquire knowledge of setting and timing defects.
2. This subjects deals assembling and dismantling, working of all weaving machineries.
3. Students are given importance to calculate production, speeds calculations and quality control aspects.

Laboratory Experiments: NOTE: The experiments are to be carried using discrete components only.	Revised Bloom's Taxonomy (RBT) Level
1. Study of passage of material through loom, Calculation of loom speed	L5, L6
2. Dismantling, assembling, setting and timing of tappet shedding mechanism.	L2, L3, L4
3. Dismantling, assembling, setting and timing of cone over pick.	L2, L3, L4
4. Dismantling, assembling, setting and timing of cone under pick.	L2, L3, L4
5. Dismantling, assembling, setting and timing of Beat-up mechanism	L2, L3, L4

6. Dismantling, assembling, setting and timing of Take-up mechanism, calculation of dividend, PPI and pick spacing, anti crack motion.	**L2, L3, L4**
7. Dismantling, assembling, setting and timing of Let-off mechanism.	**L5, L6**
8. Dismantling, assembling, setting and timing of Loose-reed mechanism and Fast- reed mechanisms.	**L2, L3, L4**
9. Dismantling, assembling, setting and timing of side weft fork, and centre weft form motion.	**L2, L3, L4**
10. Drive for pick counter problems on pick counter reading and production, efficiency of loom.	**L5, L6**
11. Study of different types of box motions. Preparation of weft patterns and drop box chains to control box motions.	**L5, L6**
12. Weaving practice on Non-auto and box looms. Speed calculation and production calculation of automatic loom and plain looms.	**L2, L3, L4**
13. Demonstration, dismantling, assembling, setting, timing of cop changing and weft feeler mechanism in an automatic looms. Setting of feeler mechanism, shuttle protector motion, transfer hammer, shuttle eye cutter, temple eye cutter on automatic loom.	**L1,L2, L3, L4**
14. Demonstration, dismantling, assembling, setting, timing of warp stop motion and positive let-off motion in an automatic looms.	**L5, L6**

COURSE OUTCOME
1. Students acquire knowledge on various weaving motions, settings timings, production calculations and rapiers.
2. After acquiring knowledge in this subject, students will be able to work in various industry.

Graduate Attributes (as per NBA)
- Engineering Knowledge.
- Problem Analysis.
- Design/Development of solutions.

Conduct of Practical Examination:

1. All laboratory experiments are to be included for practical examination.

2. Students are allowed to pick one/two experiment from the lot.

3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.

4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

	CHEMICAL PROCESSING OF TEXTILES LAB-II [As per Choice Based Credit System (CBCS) scheme]		
	SEMESTER – IV		
Laboratory Code	17TXL48	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03
	CREDITS – 02		

COURSE OBJECTIVES

- To make the students gain practical knowledge about chemical processing operations especially the preparatory processes.
- To achieve perfectness in experimental skills and the study of practical applications will bring more confidence and ability to understand the recipes used in the operations such as desizing, scouring, bleaching and mercerizing.
- To develop practical exposure to machines used and the process conditions in achieving expected results in various chemical processing preparatory experiments.

Laboratory Experiments: **NOTE: The experiments are to be carried using discrete components only.**	Revised Bloom's Taxonomy (RBT) Level
1. Dyeing of Cotton yarn / fabric using direct dyes	**L5, L6**
2. Dyeing of Cotton yarn / fabric using reactive dyes (Procion M, H, HE Dyes, Ramazol dyes)	**L2, L3, L4**
3. Dyeing of Cotton yarn / fabric using Vat/ soluble vat dyes (IN, IK, IW Methods)	**L2, L3, L4**
4. Dyeing of Cotton yarn / fabric using Azoic colours	**L5, L6**
5. Dyeing of Cotton yarn / fabric using Sulphur dyes	**L5, L6**
6. Dyeing of silk with acid and basic dyes	**L2, L3, L4**
7. Dyeing of silk with metal complex dyes	**L5, L6**
8. Dyeing of acrylic using basic dyes	**L2, L3, L4**
9. Dyeing of polyester using disperse dyes with carrier, HTHP and Thermosol dyeing technique	**L2, L3, L4**
10. Dyeing of garments with various classes of dyes	**L5, L6**
11. Dyeing of cotton, silk and wool using important natural dyes	**L5, L6**
12. Determination of K/S and matching of shades using spectrophotometer	**L5, L6**
13. Analysis of dyes, chemicals and auxiliaries	**L5, L6**
14. Measurement of washing / rubbing fastness of dyed goods	**L2, L5, L6**

COURSE OUTCOME

- The students will be able get hands on experience of dyeing of different classes of fibres, fabrics and garments
- They will get experience on various dyeing equipment, settings and handling.
- The students will be exposed to work on computer colour matching instruments and related software.

Graduate Attributes (as per NBA)

- Engineering Knowledge.
- Problem Analysis.
- Design/Development of solutions.

Conduct of Practical Examination:

1. All laboratory experiments are to be included for practical examination.

2. Students are allowed to pick one/two experiment from the lot.

3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.

4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

SEMESTER - V

SPINNING TECHNOLOGY – III
[As Per Choice Based Credit System (CBCS) Scheme]

SEMESTER - V

Subject Code	17TX52	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :

The objective of this Course is to make students understand the basic spinning processes in Textile Industry and to understand the various spinning operations such as Ring frame Doubling and unconventional methods of spinning. Students acquire theoretical knowledge about the machineries used

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Objects of ring spinning, study of different drafting systems and type importance. Principles of twisting, factors affecting the twist Calculation, Difference between Actual and Practical TPI. Principal of winding. Types of builts. Roller setting, draft and its calculation. Rings and Travelers. Different types of rings, selection of rings and manufacture of rings. Types of travelers, traveler numbering both in direct and indirect system. Manufacture of travelers.	**11 Hrs**	L1, L2
MODULE 2: Forces acting on traveler. Faulty packages of Ring frame and remedial measures. Modern developments of Ring frame and salient features of the present day ring frame. Calculations of Ring frame such as production, efficiency, Traveller speed and count etc. Various quality control studies at Ring frame such as breakage study, idle spindle study, snap study and yarn parameter such as U%, CV%, Neps CSP, Actual and Nominal count etc.	**11 Hrs**	L1, L2
MODULE 3: Doubling frame – objects of doubling and conditions to get balanced double yarn. Preparation of doubling, Types of doubling systems. Study of Two for one twister. Threading through different types of wet doubling systems. Defects in doubling and remedies. Open-end spinning – principle and objects of open-end spinning. Classification of open-end spinning.	**10 Hrs**	L1, L2, L3
MODULE 4: Principle and Technique of rotor spinning and detailed study of rotor spinning such as initial drafting, transport zone, twisting and yarns formation Types of opening rollers and rotors and their effect on the performance of OE machine. Calculations of Open end spinning machines. Modern developments in OE machine.	**10 Hrs**	L1, L2, L3, L4

MODULE 5: Study of Types of Sewing threads and their applications. Fancy yarns and their production and applications Study of Advanced Spinning systems such as DREF spinning, Air jet spinning, Twist less spinning, Bob-Tex Spinning, Core and Cover spun yarn spinning. Quality studies of all unconventional methods of spinning. Comparison between conventional and unconventional methods of spinning	10 Hrs	L2, L3

COURSE OUTCOMES:

On completion of this course, Students will be able to

1. Learn the various spinning processes carried
2. Gain knowledge about the machinery and Process about Ring frame, Doubling frame and other unconventional methods of spinning
3. Will be able to understand the basics of spinning Technology

Graduate Attributes (as per NBA)

➢ **Engineering Knowledge**
➢ **Problem Analysis**
➢ **Design/development of solutions (partly)**
➢ **Interpretation of data**

Scheme of Examination / Question paper pattern

• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.

• Students have to answer five full questions choosing one full question from each module

Text Books:

1. 1. **Manual of Cotton Spinning**-Vol V, Ed, AFW COULSON 1958, Textile Institute, Manchester
2. **Technology of short staple spinning**- Vol III and IV, W Klein, 1989, Textile Institute Pub.Manchester
3. **Spun Yarn Technology-** Oxteby 1987, Butterworths, London
4. **Cotton Spinning Calculations**- T. K. Pattabhiraman, 1979, Soumaya Pub, Bombay
5. **O. E. Spinning**- R. Rajgopalan, 1981, Textile Association of India, Delhi
6. **Spinning in 70s**-P.R. Lord, 1970, Merrow Pub. Co. Ltd. London

References:

1. Contemporary Textile Engineering-F Happy, 1981, ACADEMIC press Inc.
2. Hand book of Cotton Spinning-William Taggart, 1979, Universal Pub. Corp.
3. Essential facts of Practical Cotton Spinning-T. K. Pattabhiraman, 1979 Soumaya Pub,Bombay.
4. NCUTE Pilot Programme

FABRIC MANUFACTURING TECHNOLOGY – III
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - V

Subject Code	17TX53	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :

This course aims at updating the knowledge of students in the following field of Fabric Manufacturing Technology.

1. Dobby Mechanisms, designs, constructions, settings, recent advance in dobby, lattice preparations.
2. Jacquard Shedding various types, open shed, jacquard special jacquard M/c, Harness systems
   Tie- ups card cutting and casting out.
3. Unconventional looms: Prerequisites, selection, Requirements, weft insertion stages advantages Techno economic feasibilities.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Introduction to dobby, Classification, comparisons of tappet, dobby, jacquard, Characteristics of different dobby, Keighly dobby, cam dobby, paper controlled dobby, cross border dobby, pick finding devices for dobby, timings & settings, positive dobby's, different types of positive dobbys, Characteristics & working C/B dobby method of pegging lattice for left hand & right hand dobby.	**10 Hrs**	L1, L2
MODULE 2: Jacquard functions, Types of Jacquard, principle parts of jacquard. Working principle of single lift single cylinder, double lift single cylinder Double lift double cylinder and cross border jacquard, Special jacquard m/c.	**10 Hrs**	L1, L2
MODULE 3: Developments in mechanical Jacquard, open shed Jacquards, Jacquard harness tie-ups card cutting m/c and producers, casting out, increasing figuring capacity of Jacquard, Electronic Jacquard, programming possibilities in jacquard.	**10 Hrs**	L1, L2, L3
MODULE 4: Introduction to unconventional looms, disadvantages of conventional looms. Unconventional selvedges, classification of shuttle less looms, weft accumulators, prerequisites for installation of shuttle less weaving m/c. yarn quality requirements, Weft insertion by Projectile, Weft insertion stages. Torsion bar picking, salient features of projectile looms.	**11 Hrs**	L1, L2, L3, L4
MODULE 5: Classification of Rapier looms. Weft insertion stages in Dewas&Gabler system salient features. Air quality requirements for Air Jet, method of weft insertion on Air jet, water Jet looms multiphase, weaving flat multiphase circulars looms Narrow looms, triaxial looms. Management of loom shed, plant layout, ventilation & humidification, lighting & material handling.	**11 Hrs**	L2, L3

COURSE OUTCOMES:
1. This course prepares the students to know the dobby, jacquard application and new concepts.
2. Students are exposed to the unconventional methods of weaving, techno economic studies, productivity & material handling.
3. Students are able to understand the preparatory process & yarn quality requirements. Loom maintenance and management of loom shed.

Graduate Attributes (as per NBA)
➢ **Engineering Knowledge**

➢ **Problem Analysis**	
➢ **Design/development of solutions (partly)**	
➢ **Interpretation of data**	

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Principles of Weaving-**By ATC Robinson, R. Marks, 1976, Textile Institute, Manchester, London
2. **Shuttle less Weaving Machine** - OldrichTalavasek and Uladimin, Svaty, Elsevlin, 1981 ScientificPub. Co., New YORK
3. **Modern Weaving Theory and Practice**-,ISHIDA
4. **Weaving, Machines, Mechanisms & Management-** D.B.Ajgaonkar, Talukdar

REFERENCES::
1. **Modern Preparation and weaving Machinery**-A Ormerod, 1983, Butterworths London.
2. **Cotton Weaving by** -V. Gordev, P Volkov, L Blinov 1987. Mir PUB.
3. **Weaving Mechanism-** Vol I & II, Prof. N N Banerjee 1982, Textile Book House, WESTBENGAL.
4. NCUTE Course material-Woven Cloth Production-IIT, New Delhi, 4000

CHEMICAL PROCESSING OF TEXTILES -III
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - V

Subject Code	17TX54	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :
The objective of this Course is to make students understand the advanced concepts of chemical processing sequences such as printing and finishing. To make them analyze the process conditions in various printing processes, recipes etc. Students will be made to understand and analyze the concepts of textile finishing processes, finishing chemicals and advancements in the areas of printing and finishing techniques.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: **INTRODUCTION TO TEXTILE PRINTING** - An overview of the printing process. Selection ofdyes/pigments/auxiliaries and textile substrate to suit the end use of the printed textile materials. The constituents and characteristic of printing paste. Brief study of different binders, thickeners, solvents, discharging agents and other ingredients of printing paste	**11 Hrs**	L1, L2
MODULE 2: **STYLES OF PRINTING** – Direct, discharge, resist and special styles - chemicals and mechanisms used forthe above styles. **METHODS OF PRINTING** – Printing by Hand block, Roller, hand screen, semi -automatic screen, flatbed and	**11 Hrs**	L1, L2

rotary screen printing methods. Developments in printing machinery.		
MODULE 3: **TRANSFER PRINTING** – Principle, mechanisms and continuous transfer printing – Transfer printingmachinery. **METHODS OF PRINT FIXATION –** Drying, curing by dry heat, steam fixation etc.	**10 Hrs**	L1, L2, L3
MODULE 4: **FINISHING** - objects and methods of finishing. Classification of various finishes – Various finishing chemicals used and their properties. CALENDERING – Principle, types of calendaring machines used, merits and demerits. SANFORIZATION **–** principle and the process. Anti-crease finish on cotton and protein fibre fabrics. Water repellent/proof finishes, fire retardant finishes. Finishing of woolen materials, silk fabrics and blended products.	**10 Hrs**	L1, L2, L3, L4
MODULE 5: Finishing of synthetic fibre fabrics - heat setting, de-lustering, anti-static, soil release finishes. Fundamentals of computerized colour matching – K/S evaluation and principle of spectrophotometers.	**10 Hrs**	L2, L3

COURSE OUTCOMES:
On completion of this course, Students will be able to
1. Learn the various printing styles and processes carried out.
2. Gain knowledge about the machinery and process parameters of various printing machines used in textile/garment industry
3. Will be able to understand the basics and advances in finishing technology.

Graduate Attributes (as per NBA)
➢ Engineering Knowledge
➢ Problem Analysis
➢ Design/development of solutions (partly)
➢ Interpretation of data

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

TEXT BOOKS:

1. **Textile printing -** V.A.Shenai, Sevak publications, Mumbai,1996
2. **Textile printing –** L.W.C. Miles, Butterwoths publications
3. **An Introduction to Textile Finishing -** J T Marsh, B Publications, 1979

REFERENCE BOOKS:

1. **Rendering with Pen and Ink-**Thames and Hudson Publication
2. **Printed Textiles-** A Guide To Creative Design Fundamentals, Terry and Gentelle
3. **Chemical Processing** NCUTE Publications 4000 & 4001

KINITTING TECHNOLOGY
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - V

Subject Code	17TX551	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :

The objective of this course is to make students understand the basic concepts of Warp and weft knitting operations on all knitting machines.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Knitting industries position in India, general terms and principles of knitting technology. Knitting Elements, Elements of knitted loops structures. Comparison of warp and weft knitting. **WEFT KNITTING:** The four primary weft knitted structures –Plain, Rib, Interlock and Purl. Production of above structures on knitting machines	**10Hrs**	L1, L2
MODULE 2: Types of weft knitting machines – flat machines and circular machines. Knit, Tuck and Float stitches. The effect of Tuck and float stitches on knitted fabrics. Ornamentation of weft knit structures: Horizontal striping, intarsia, plaiting.	**11Hrs**	L1, L2
MODULE 3: Derivatives of plain and rib structures. Double knits. Needle selection for weft knit designing: Multi cam track, Pattern wheel, Pattern drum and Electronic selection device.	**10Hrs**	L1, L2, L3
MODULE 4: Aspects of knitting science- knitted fabric geometry, tightness factor, robbing back, and needle bounce. Different types of positive feeds and their advantage. Different cams used on knitting machine. Properties of hosiery yarns. Defects in weft knitted fabrics.	**11Hrs**	L1, L2, L3, L4
MODULE 5: Principles of warp knitting; Swinging and shogging motion. Five basic overlap, under-lap variations. Study of Tricot and Raschel warp knitting machines. Single bar structures. Piller stich, single tricot and atlas structures. Two bar fabrics: Lock knit, full tricot and satin.	**10Hrs**	L2, L3

COURSE OUTCOMES:

1. Students will be able to understand the production of warp and weft knitted structures.
2. Student's practical knowledge will be updated regarding different types of knitted structures such as single jersey, rib structures.
3. Students will be able to perform well in knitting industries.

Graduate Attributes (as per NBA)

➢ Engineering Knowledge

> ➤ Problem Analysis
> ➤ Design/development of solutions (partly)
> ➤ Interpretation of data

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

TEXT BOOKS:
1. **Knitting Technology -** David J Spencer, Pergamon Press 1985, New York
2. **Knitting Technology -** Ajgaonkar, Universal Publishing Company, Bombay 1998
3. **Circular Knitting** - MammelSchach

REFERENCES::
1. **Knitting Technology-** Dr. Munden
2. **Knitting Fundamentals, Machines, structures and developments** – N. Anbumani, New AgeInternational Pub., 4007.

TEXTILE MECHANICS AND CALCULATIONS
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - V

Subject Code	17TX552	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :
The objective of this course is to describe the types of driving arrangement to the parts of Textile machineries. Students acquire theoretical and Practical Knowledge on calculations pertaining to textile operations.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Transmission of Motion by belt and gear drives. Design difference between belt and gear drives. Effect of Belt thickness on speed of different parts. Study of Centrifugal and Centripetal force. Brief Explanation of Fast and loose pulleys and grooved pulleys.	**11 Hrs**	L1, L2
MODULE 2: Rack and Pinion, Traversing mechanisms. Determination of Speed through gear and pulley drives, sun and planet gears in spinning and weaving industry. Study of different types of cams such as 3 leaved cam, Heart shaped cam and Irregular shaped cam and their utility in spinning industry. Types of tappet cams and their application in weaving industry	**11 Hrs**	L1, L2

MODULE 3: Study of Roller eccentricity and its effect on drafting rollers of spinning machineries. Construction and Displacement, Velocity and acceleration diagrams. Rectification of roller eccentricity. Types of drafting rollers and their importance. Importance of eccentricity in weaving machineries .	10 Hrs	L1, L2, L3
MODULE 4: Study of clutches and brakes and their utility. Study of shedding, picking and beat-up and other mechanisms. Essential weaving calculations like winding rate in double flanged bobbin, cone precision winders.	10 Hrs	L1, L2, L3, L4
MODULE 5: Production calculations related to weaving, Warping and sizing. Reed calculations. Problems related to efficiency. Yarn count calculation in direct and indirect system. Average count and resultant count and fabric weight calculations**.	10 Hrs	L2, L3

COURSE OUTCOMES:
On completion of this course, Students will be able to
1. Learn the types of driving arrangement on Textile Machineries.
2. Gain knowledge about Speed calculation
3. Update their basic knowledge about driver and driven parts.

Graduate Attributes (as per NBA)
- ➢ **Engineering Knowledge**
- ➢ **Problem Analysis**
- ➢ **Design/development of solutions (partly)**
- ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Textile Mathematics Volume 1,2,3 by J.E. Booth**
2. **Textile Mechanics by Textile Institute Volume 1 & 2**
3. **Weaving calculations by Sengupta**.

REFERENCES::
1. **Basic Textile Mathematics by A.K. Khare**
2. **Hand book of Cotton Spinning,** William Taggart., Universal Publ. Corp. 1979.
3. **Essential Facts of Practical Cotton Spinning**, Pattabhiraman. T.K., Soumya Pub., Bombay 1979.

ERECTION AND MAINTENANCE OF TEXTILE MACHINERY [As Per Choice Based Credit System (CBCS) Scheme] **SEMESTER - V**			
Subject Code	17TX553	IA Marks	40

No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :

The objective of this course is to make students understand the basic spinning processes in Textile Industry and to understand the various spinning operations such as Blow Room, Carding. Students acquire theoretical knowledge about the machineries used. They will be familiarized with erection and maintenance schedules of various machineries used in spinning and weaving.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Basic definitions related to mechanical design, vibration resistance, heat resistance, reliability, longevity, maintainability .Brief outline of engineering material. Different kinds of tools and the devices employed for erection and maintenance. Erection of machines, hoisting - equipment, overhead cranes, machine installation conditions. Functions, prerequisite of maintenance and its classification.	**11 Hrs**	L1, L2
MODULE 2: Function and classification of power transmission equipment and transmission members. Erection of machines, hoisting - equipment, overhead cranes, machine installation conditions. Functions, prerequisite of maintenance and its classification.	**11 Hrs**	L1, L2
MODULE 3: Methods and kinds of repairs of textile equipment used in different departments. Cleaning and washing of parts. Various kinds of wears. Main factors influencing the wear of machine parts and methods increasing their wear resistance. Failure prediction of parts, units and mechanisms	**10 Hrs**	L1, L2, L3
MODULE 4: Basic concepts of maintenance, Study of different maintenance programme, routine and preventive, predictive, remedial and restorative maintenance. Maintenance of spinning, weaving, processing equipment as per the schedule.	**10 Hrs**	L1, L2, L3, L4
MODULE 5: Function of prerequisite of lubricants, different lubricants used in the textile industry, method of lubrication. Maintenance of ledgers spare parts etc. machinery maintenance audit and its advantages. Housekeeping, overhauling.	**10Hrs**	L2, L3

COURSE OUTCOMES:

On completion of this course, Students will be able to

1. Learn the various spinning processes carried
2. Gain knowledge about the maintenance of all the Textile Machineries
3. Learn the types of maintenance

Graduate Attributes (as per NBA)
  ➢ **Engineering Knowledge**
  ➢ **Problem Analysis**
  ➢ **Design/development of solutions (partly)**
  ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Spinning Textile machinery maintenance-** Pub, SITRA Coimbatore 1960
2. **Weaving Textile Machinery maintenance Pub-** BITRA, Bombay 1960
3. **Spinning, Weaving- & processing machinery maintenance in textile mills-** B.B. Joshi, et al,Textile & Allied industry research organization, Baroda, 1970

Reference
1. **Repairs and maintenance**- Pub, MIR

NANO TEXTILES
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - V

Subject Code	17TX554	IA Marks	40
Nu. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :
• To teach the concept of nano technology and its application in textiles.
• To educate the production of nanofibres by different process
• To impart knowledge on nano composites and their properties.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: **Nano fibres** Process: Electro spinning – properties – improvement – fibre morphology – fibre alignment. Bicomponent cross sectional nano fibre	**10Hrs**	L1, L2
MODULE 2: **Nanotubes and Nano Composites** Carbon nano tubes: synthesis – characterization techniques – nano tubes – Polymer fibres – structures – production process – properties – fibre morphology. Carbon nanotubes applications	**11Hrs**	L1, L2
MODULE 3:	**10Hrs**	L1, L2, L3

Nanofiller Polypropylene Fibres Polymer layered silicate nano composites: structure and properties – Nano composites Dyeing of Polypropylene – Modified propylene for improved dyeability. Assessment of dyed polypropylene		
MODULE 4: **Nano Coating of Textiles** Surface modification techniques – anti-adhesive nano coating of fibre and textiles – water and oil repellent coating – self-cleaning. Functional textiles: protection – applications. Applications of nano coated textiles for filtration	**10Hrs**	L1, L2, L3, L4
MODULE 5: **Hybrid Polymer Nanolayers** Thin hybrid film – smart textiles – polymer to polymer hybrid layers – polymer to particles hybrid layers. Nanofabrication of thin polymer fibre – "Grafting from" and "Grafting to" techniques for synthesis of polymer films, synthesis of smart switchable coatings. Synthesis of hdrophobic materials	**11Hrs**	L2, L3

COURSE OUTCOMES:
- The graduates will become familiar with fundamentals of various science and technology subjects and thus acquire the capability to applying them.
- The graduates will demonstrate their ability to solve technical problems via technical approaches, self-study, team work and life-long learning approaches.
- The graduates will develop capacity to understand professional and ethical responsibility and will display skills required for continuous and life-long learning and up gradation.
- The graduates will have sound foundation for entering into higher education programmes.

Graduate Attributes (as per NBA)
- Engineering Knowledge
- Problem Analysis
- Design/development of solutions (partly)
- Interpretation of data

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

TEXT BOOKS
1. P. J. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead Publishing Limited, England, 4007.
2. BharathBhushan, Springer Handbook of Nanotechnology, Springer, 4004.

REFERENCE BOOKS:
1. H. Zeng, L. Zhu, G. Hao and R. Sheng, Synthesis of various forms of Carbon Nanotubes by AC Arc Discharge, Carbon Vol. 36, pp. 259-261, 1998.
2. K. Yamamoto, S. Akiya and Y. Nakayama, Orientation and Purification of Carbon Nanotubes using AC Electrophoresis, Applied Physics, Vol. 31, L 34-L 36, 1999.
3. E. Hammel, X. Tang, M. Trampert, T. Schmitt, K. Mauthner, A. Eder and P. Potschke, Carbon Nanofibers for Composites Applications, Carbon, Vol. 42, pp.1173-1178, 4004.

SPINNING TECHNOLOGY LAB-III			
[As per Choice Based Credit System (CBCS) scheme]			
SEMESTER – V			
Laboratory Code	17TXL56	IA Marks	40
Number of Lecture Hours/Week	01 Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03
CREDITS – 02			

Course objectives:
The objective of this course is make students understand and practically carryout experiments pertaining to spinning subject. The experiments designed will enable them to practically analyse the importance of each process and calculations related to them

Laboratory Experiments: NOTE: The experiments are to be carried using discrete components only.	Revised Bloom's Taxonomy (RBT) Level
1. Study of passage of material through Ring Frame and demonstration of its working and functions of each parts.	L5, L6
2. Calculation of spindle speed, front roller speed TPI through gearing diagram and also by changing the pulleys and concerned change wheels	L2, L3, L4
3. Calculation of Twist constant through gearing and also TPI calculation for different TCP	L2, L3, L4
4 Break Draft, Main Draft and Total draft calculation through gearing diagram.	L5, L6
5. Study of building mechanism and different types of builds.	L5, L6
6. Working of Ring Frame and calculation of count of yarns for the roving fed by changing the wheels	L2, L3, L4
7. Working of Ring Frame with different Twist Change wheels	L5, L6
8. Maintenance schedule of Ring Frame	L2, L3, L4
9. Calculation of Spindle Speed, TPI through gearing on doubling frame	L2, L3, L4
10. Calculation of twist constant, TPI & TPM for different TCP.	L5, L6
11. Demonstration and calculation on O.E. Spinning machine.	L5, L6
12. Practicing and piecing on Ring Frame and study of end breaks	L5, L6

Course outcomes:
1. Students will be able to carry out the experiments practically.
2. They will be exposed to various process conditions, production calculations and settings.
3. The subject makes them thorough with various settings of machines and handling to produce the required products.

Graduate Attributes (as per NBA)
- Engineering Knowledge.
- Problem Analysis.
- Design/Development of solutions.

Conduct of Practical Examination:
1. All laboratory experiments aretobeincludedforpracticalexamination.
2. Studentsare allowed to pick one experimentfrom the lot.
3. Strictlyfollow theinstructions as printed on the cover page of answer script for breakup of marks.
4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

FABRIC MANUFACTURING TECHNOLOGY LAB-III
[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – V

Laboratory Code	17TXL57	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03

CREDITS – 02

Course objectives:
1. The students will learn the preparation of pattern for dobbies and study the types of jacquards, harness and its tie-ups and prepare designs by using point paper and card cutting.
2. The students will study about the working of knitting machine, and calculate the speeds and production.
3. Learn about various knitted structures produced and do the analysis knitted fabrics and find out the particulars like WPI, CPI, Stitch density, Stitch length, loop shape factor, GSM, Kc, Kw, Ks, tightness factors

Laboratory Experiments: NOTE: The experiments are to be carried using discrete components only.	Revised Bloom's Taxonomy (RBT) Level
1. Study of working, timing & settings of dobbies.	L5, L6
2. Pattern preparation for dobby loom by using pegs and lags.	L2, L3, L4
3. Study of different types of jacquards.	L2, L3, L4
4. Study of harness and its tie-ups.	L5, L6
5. Preparation of squared paper design for 100 hooks jacquard and card punching.	L5, L6
6. Study of single jersey knitting machine: drive, knitting elements, yarn feed mechanisms, take down mechanisms and practice of knitting.	L2, L3, L4

7. Study of Rib knitting machine: drive, knitting elements, yarn feed mechanisms, take down mechanisms and practice of knitting.	**L5, L6**
8. Study of Interlock knitting machine: drive, knitting elements, yarn feed mechanisms, take down mechanisms and practice of knitting.	**L2, L3, L4**
9. Analysis of knitted fabrics for WPI, CPI, Stitch density, Stitch length, loop shape factor, GSM, Kc, Kw, Ks, tightness factors for single jersey and rib structures as per standard.	**L2, L3, L4**
10. Analysis of knitted fabrics for design: loop diagram, feeder diagram and graphical motions.	**L5, L6**
11. Analysis of modified single jersey design: loop diagram, feeder diagram and graphical motions.	**L5, L6**
12. Study of spirality of single jersey fabrics.	**L5, L6**

Course outcomes:
  ➢ Students will be able to understand to prepare the designs and produce the samples on the loom.
  ➢ Students will be able understand the working of knitting machine, its elements and how to produce the knitted structures

Graduate Attributes (as per NBA)
 • Engineering Knowledge.
 • Problem Analysis.
 • Design/Development of solutions.

Conduct of Practical Examination:
1. All laboratory experiments aretobeincludedforpracticalexamination.
2. Studentsare allowed to pick one experimentfrom the lot.
3. Strictlyfollow theinstructions as printed on the cover page of answer script for breakup of marks.
4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

CHEMICAL PROCESSING OF TEXTILES LAB-III [As per Choice Based Credit System (CBCS) scheme] **SEMESTER – V**			
Laboratory Code	17TXL58	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03
CREDITS – 02			

Course objectives:
  1. This subject aims to acquire knowledge of various color theory and printing process of textiles.
  2. Practical knowledge on different printing process bring more confidence in students and they are exposed to different equipments, printing recipes.
  3. Knowledge on recent developments.

Laboratory Experiments: **NOTE: The experiments are to be carried using discrete components only.**	**Revised Bloom's Taxonomy (RBT) Level**

No.	Experiment	Levels
1.	Preparation of colour charts by light, pigment, chromatic circle and Brewster's theory	**L5, L6**
2.	Preparation of printing paste using pigment colours	**L2, L3, L4**
3.	Printing practice using Hand blocks and screens with various classes of dyes	**L2, L3, L4**
4.	Preparation of screens for screen-printing.	**L5, L6**
5.	Resist style (batik) of printing on fabrics	**L5, L6**
6.	Discharge style of printing on cotton, PET and silk	**L2, L3, L4**
7.	Tie and dye printing	**L5, L6**
8.	Anti-crease finishing of cotton using formaldehyde and non-formaldehyde based chemicals	**L2, L3, L4**
9.	Softening of cotton and wool	**L2, L3, L4**
10.	Water proof finishing on cotton	**L5, L6**
11.	Experiments on fastness properties of dyed and printed fabrics	**L5, L6**
12.	Evaluation of dye uptake- K/S using spectrophotometer	**L5, L6**
13.	Experiments on Finishing of garments	

Course outcomes:
1. This course helps the students to acquire practical knowledge of various color theory and printing process.
2. Students are exposed to process control, chemicals and auxiliaries used, instruments.
3. This subject prepare the students work in various chemical processing industries.

Graduate Attributes (as per NBA)
- Engineering Knowledge.
- Problem Analysis.
- Design/Development of solutions.

Conduct of Practical Examination:
1. All laboratory experiments aretobeincludedforpracticalexamination.
2. Studentsare allowed to pick one experimentfrom the lot.
3. Strictlyfollow theinstructions as printed on the cover page of answer script for breakup of marks.
4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

SEMESTER – VI

SERICULTURE AND SILK TECHNOLOGY
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VI

Subject Code	17TX61	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :

This course aims at updating the knowledge of students in the following field of Silk fiber Technology.
1. Status of sericulture and growth of silk industry in India & abroad
2. Principles of Rearing silk worms, environmental condition of rearing, grainages.
3. Physical and commercial characteristic of cocoon reeling M/c. Technology advancements
4. Silk by products, wet processing, and recent developments in wet processing.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Introduction to Sericulture and silk industry, Status of sericulture and silk industry in India and abroad. Mulberry cultivation practices, environmental conditions, types of mulberry, Silk worm rearing, and Environmental conditions for silk worm rearing, various methods. Chawki rearing, Late age silk worm rearing, recent developments in rearing. Seed production & Grainage activities. Diseases & pests & their control	10 Hrs	L1, L2
MODULE 2: Different types of cocoons, Physical and commercial characteristics, sorting and testing of cocoons. Stifling of cocoons, objects, various methods: open pan, three pan, Conveyor cooking etc. Merits & Demerits of silk reeling, systems of reeling, charka, Cottage basin, multi end filature automatic reeling machine, Re-reeling, recent developments in silk reeling	11 Hrs	L1, L2
MODULE 3: Silk throwing, Objects, Winding, doubling, Rewinding and twisting, Manufacture of silk yarns for ordinary, Chiffon, Crape, Georgette fabrics. Recent developments in silk throwing machines. Silk weaving preparatory for warp & weft yarns, handloom & power looms special features, modifications required to weave silk fabrics	11 Hrs	L1, L2, L3
MODULE 4: Introduction to spun silk industry, Different source of waste, Sequence of operations in spun silk production, end uses of spun silk yarns. Noil yarns.	10 Hrs	L1, L2, L3, L4

Testing & grading of silk yarns. Chemical processing of silk degumming of silk fabrics.		
MODULE 5: Dyeing of silk fabrics. Printing & finishing of silk fabrics. Recent developments in wet processing of silk fabrics, silk by-products, properties and application. Introduction to non-mulberry silks and their applications.	**10 Hrs**	L2, L3

COURSE OUTCOMES:

1. This course make the students to understand silk potential in India and abroad
2. Student can take the projects and research work in Silk Technology field jointly with KSSRDI, central silk board, and State Silk Board.
3. Students to be become entrepreneurs in silk industries like Reeling, Twisting, Silk weaving

   and by products this course will give valuable outputs

Graduate Attributes (as per NBA)

- ➢ **Engineering Knowledge**
- ➢ **Problem Analysis**
- ➢ **Design/development of solutions (partly)**
- ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern

• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:

1. **Hand Book of practical sericulture**- S R Ullal and M N Narasimhanna,1987
2. **Silk manual**- FAO Publication
3. **Hand Book of Silk Technology-** T NSonwalkar
4. Mulberry silk Reeling Technology- D. Mahadevappa, V G Halliyal, D G Shankar, RavindraBhandiwad, Oxford and IBH publishing company Pvt. Ltd, 4000

REFERENCES::

1. Silk Weaving- Compiled by Zhejiang Silk engineering institute.

TEXTILE TESTING - I
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VI

Subject Code	17TX62	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :

The objective of this course is to make students understand the importance of textile testing and quality control in textile industry. Students are trained to understand various methods and instruments used for testing of fibres and yarns. Students are trained to test the fibres and yarns for various properties, and, calculate, analyse, compare and draw suitable conclusions.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level

MODULE 1: Introduction to textile testing & quality control. Sampling techniques. Conditioning of Testing lab and textile materials. Moisture regain and its measurement by various techniques.	**11 Hrs**	L1, L2
MODULE 2: Fiber dimensions Viz., length, fineness, maturity and strength- technological importance & determination by various conventional methods. Neps, causes & effects of nep generation, nep counting.	**11 Hrs**	L1, L2
MODULE 3: Fibre Quality Index (FQI), its importance & calculations. Study of High Volume Instrument (HVI), modules and fibre quality testing parameters. Application of HVI results in spinning mills. Advanced Fibre Information System (AFIS) - working principle, features. AFIS test data analysis.	**10 Hrs**	L1, L2, L3
MODULE 4: Study of various systems of yarn count & its measurements by various methods & instruments. Yarn twist & its effects on yarn & fabric properties. Importance of twist multiplier. Principles & measurements of single yarn and double yarn twist.	**10 Hrs**	L1, L2, L3, L4
MODULE 5: Yarn strength & its importance. Methods and principles of yarn strength testing. Instruments and measurement of yarn strength. Yarn friction and its measurement. Study of norms and standards pertaining to above fibre and yarn properties.	**10 Hrs**	L2, L3

COURSE OUTCOMES:
On completion of this course, Students will be able to
1. Do testing of textile fibres and yarns
2. Learn methods and principle of testing involved
3. Know the instruments used and the principle of working
4. Understand the quality parameters of textile materials
5. Do the tabulation test results, analysis and comparison

Graduate Attributes (as per NBA)
1. Engineering knowledge and its application to measure the quality of fibres and yarns
2. Understanding quality of fibres and yarns
3. Analysis quality problems
4. Design/development and solutions for quality problems
5. Interpretation of test data and conclusion

Scheme of Examination / Question paper pattern
1. Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
2. Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Physical testing of textiles** – B.P. Soville, Wood Head – 1999.
2. **Principles of Textile Testing,** Booth J. E., Butterworth, Wendon III Edition.
3. **Handbook of Textile Testing and Quality Control,** Grover and Hamby, Wiley Eastern Pvt. Ltd., New Delhi 1969.
4. **Physical Properties of textile fibres,** Morton and Hearle, The Textile Institute, Manchester.

5. **Textile Testing,** Skinkle –T. B. Tarapurwal sons and co. Pvt Ltd., Bombay.
6. **Characteristics of raw cotton**- Textile Institute.

REFERENCES::
1. **Textile Testing,** James Lomak, Longmans, Green and Co. London.
2. **B.I.S. Handbook,** BIS publications, 1985.
3. **B.S. Handbook**, B S Publications 1985.
4. **ASTM standard** ASTM publication 1985.
5.   **Handbook of Methods of tests for cotton fibres, yarn and Fabrics,** CTRL, Bombay
6. **Kock, Chemical Testing of Textiles**, Chapman and Hall, London.
7. **Cotton assessment and appreciation**, SITRA, Coimbatore.
8. **Keshavan and other, Physical Testing –I and II,** SSMITT, Tamil Nadu 1987.

FASHION DESIGN AND GARMENT MANUFACTURE
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VI

Subject Code	17TX63	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :
This course aims at updating the knowledge of students in the following field of Fashion designing & Garment Technology.
1. Fashion Concepts consumer expectation about textiles. Fashion theories design elements psychological influence of clothing. Techniques of body measurement standard sizes selection of fashion for different end uses.
2. Garment flow process, sourcing, sourcing issues global sourcing fabric inspection procedures, spreading various cutting methods garment making process.
3. Technology advancement process sewing m/c production techniques, Garment inspection, Shipping, SMV

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Consumer expectation of textiles. Consumer knowledge about textiles. Fashion Terminologies, elements of design, fashion theories, Factors influence fashion, Fashion cycle, Principles of design. Selection of fabrics for different end uses. Measurement Techniques	**10 Hrs**	L1, L2
MODULE 2: Sourcing, Global sourcing, Role of sourcing discussion in Apparel firms. Material sourcing process. Fabric inspection methods. Principle & practices of pattern making. Grading, Computer aided pattern making spreading, cutting, Numbering & bundling.	**11 Hrs**	L1, L2
MODULE 3: Study of different types of stitches & seams. Seams appearance & performance, study of sewing threads. Thread consumption calculation, sewing needles, Fundamentals of swing M/c, different types of sewing M/c. Work aids, puckering, reasons and remedies for different types of puckering	**11 Hrs**	L1, L2, L3
MODULE 4:	**10 Hrs**	L1, L2, L3, L4

Pressing: Types, Elements of pressing. Types of pressing equipment's. Technological advancement fusing Advantages, requirements, Fusing processes. Equipment's, methods, support materials purpose. Lining, Inter linings, Closures, Zippers, Buttons, snaps, Hooks, loop tape, Elastics, trims, Types &source of trims.		
MODULE 5: Apparel production systems garment Quality control Inspection of garments. Under different AQL standards like 2.5, 3.0 & 4.0 concept of production planning productivity, resource management Ergonomics apparel Engineering basic concepts work flow on work study techniques, SMV Calculation. Costing - Procedures, systems of costing, stages of costing, pricing strategies.	**10 Hrs**	L2, L3

COURSE OUTCOMES:
This course prepare the students to know about
1. Fashion & garment industries, fashion trends, fashion forecasting, consumer expectations of textiles.
2. Students are able to understand the production process, quality control, quality control studies, merchandising process, export & import policies.
3. Students who want to become entrepreneurs this course gives the detailed input to startup new garment industries

Graduate Attributes (as per NBA)
➢ **Engineering Knowledge**
➢ **Problem Analysis**
➢ **Design/development of solutions (partly)**
➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **The Technology of Clothing Manufacture**- Carr H. & Latham B., 1988, Blackwell Scientific Publication, Oxford England
2. **Metric Pattern Cutting**- Aldrich W 1992, blackwell Scientific Publication, Oxford England
3. **Apparel Manufacturing-** Ruth E. Glock, Grace I. Kunz PE Publication, UK, 4005

REFERENCES::
1. **Pattern Cutting for Women's Outwear-** Gerry Cooklin, 1994, Blackwell Scientific Publications, Oxford England.
2. **The NIFT Book of Grading and sizing-** Vol I and II, Published by NIFT, New Delhi
3. **Fashion Source Book**- by Kathryn Mikelvey, 1996, Blackwell Scientific Publication, Oxford, England
4. **Fusing Technology**- Cooklin G, 1990, The Textile Institute, Manchester, England

FABRIC STRUCTURE AND DESIGN - I [As Per Choice Based Credit System (CBCS) Scheme] **SEMESTER - VI**			
Subject Code	17TX64	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of	52	Exam Hours	03

Lecture Hours			

<div align="center">CREDITS - 04</div>

COURSE OBJECTIVES :

The objective of this course is to make students to learn analysis of fabrics for their various construction particulars, manufacturing data and basic designs. Students are to understand the characteristic features and aesthetic qualities of different fabrics To understand various basic designs in order to impart aesthetic value to the fabrics. Students will be able to understand the raw material requirements, machine and equipment for the production the fabric. Students understand the end uses of different fabrics and their suitability.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Classification of plain woven cloths - approximately square, warp faced and weft faced fabrics, examples of cloths with construction particulars and their applications. Elements of woven fabric structure - weaves and weave notations. Yarn crimp, cover factor & fabric weight. Drawing-in (Draft), Lifting, Denting plans.	**11Hrs**	L1, L2
MODULE 2: Ornamentation of plain fabrics. Modification of plain weaves – Rib, Matt etc. Special Rib, haircord, & mock rib structures. Twill weaves and fabrics, Twist & twist interactions. Derivatives of twill weaves. Diamond and diaper designs. Satin & Sateen weaves & fabrics.	**11Hrs**	L1, L2
MODULE 3: Simple fancy weaves such as honeycomb, brighten honeycomb, Huck a back, sponge-weaves, Mock leno, crepe & corkscrew weaves. Distorted thread effects. Bed ford cord weaves and fabrics.	**10Hrs**	L1, L2, L3
MODULE 4: Colour & weave effects. Classification of colour and weave effects, examples of simple colour & weave combinations. Colour & weave combinations to construct longitudinal stripes, cross stripes, check effects etc. BIS standards for the important commercial fabrics.	**10Hrs**	L1, L2, L3, L4
MODULE 5 Light and pigment colour theory. Classification of colours. Attributes of colours. Modifications of colours. Color harmony and color contrast. Mixed colored effects with the aid of fibre mixture yarns, twist yarn mixtures and combined colored threads in the fabrics. Various bases of textile design for figured arrangements. Brief study of history of textile design. Brief study of various historical designs with respect to their main features.	**10Hrs**	L2, L3

COURSE OUTCOMES:

On completion of this course, Students will be able to
1. Learn various construction particulars and manufacturing data
2. Learn raw requirements and loom equipment required to produce the fabric.
3. Learn the analysis of simple basic designs and features of various fabrics
4. Understand the suitability of these fabrics for particular end uses.

Graduate Attributes (as per NBA)
1. Engineering knowledge related fabric designing

2. Design analysis and aesthetic qualities
3. Design/development of basic designs
4. **Interpretation of design details and development of new designs**

Scheme of Examination / Question paper pattern
1. Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
2. Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Woven Cloth Construction, ATC Robinson and** Marks **- Textile Institute** Pub, Manchester, 1973
2. **Watson Design and Colour**- Z. J. Grosicki, Universal Pub Corp, 1988

REFERENCES::
1. **Grammar of Textile Design**-H. Nisbet pub, D. B. Taraporewala and sons, 1985
2. **Design of Woven Fabrics**-Blinov, Shibabaw Balay, MIR Pub 1989
3. **Fundamentals of woven Structure**-Edward I Golec, ITT Pub Lowell Mass 1958
4. **Modern Textile Design and Production**- R. H. Wright, National Trade Press, London 1970
5. **History of Textile Design**- V. A. Shenai, Sevak Pub Ltd, 1974.

OPERATIONS RESEARCH TECHNIQUES
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VI

Subject Code	17TX651	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :
The objective of this Course is to make students understand the basic objectives of operation research and phases of operation research technique and its applicability in textile and garment industries.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Definition of OR. Phases of OR technique. Linear programming problem by graphical and simplex method. Assignment problem by Hungarian method Balanced and unbalanced matrix. Profit and cost matrix. Problems pertaining to these matrix	**11 Hrs**	L1, L2
MODULE 2: TRANSPORTATION PROBLEM: Vogel's approximation method – Determination of Optimal solution by MODI method, North west corner Rule and- Least cost entry method	**11 Hrs**	L1, L2
MODULE 3: Replacement. Objects of replacement. Types of Replacement such as Individual replacement, Group replacement. Problems pertaining to these types of	**10 Hrs**	L1, L2, L3

replacement problems. problems		
MODULE 4: Queing theory, queue, Waiting line FIFO and LIFO with examples. Customer's behavior in queue. M/M/I System and its details. Brief study about CPM and PERT	**10 Hrs**	L1, L2, L3, L4
MODULE 5: Sequencing. Meaning of sequencing and assumptions made in sequencing problems. Types of Sequencing models such as n jobs on two machines and n jobs on three machines. Determination of Optimal sequence and calculation of Total Elapsed Time (TET)	**10 Hrs**	L2, L3
COURSE OUTCOMES: On completion of this course, Students will be able to 1. Learn the various models of operation research technique 2. Gain knowledge about the phases and formulation 3. Will be able to understand the application of this scientific tool		

Graduate Attributes (as per NBA)
   ➢ **Engineering Knowledge**
   ➢ **Problem Analysis**
   ➢ **Design/development of solutions (partly)**
   ➢ **Interpretation of data**		

Scheme of Examination / Question paper pattern • Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module. • Students have to answer five full questions choosing one full question from each module		
Text Books: 1.Operation research Techniques by O.P. Khanna 2. Management and operation research technique by Banga and Sharma 3. Operation research Technique by Prof. Govardhan		
REFERENCES:: 1. Hira and Gupta "Introduction to Operations Research", S. Chand and Co.4002 2. Hira and Gupta "Problems in Operations Research", S. Chand and Co, 4002. 3. Panneerselvam, "Operations Research" Prentice Hall of India, 4003. 4. Wagner, "Operations Research", Prentice Hall of India, 4000.		

ENVIRONMENTAL MANAGEMENT IN TEXTILE INDUSTRY			
[As Per Choice Based Credit System (CBCS) Scheme]			
SEMESTER - VI			
Subject Code	17TX652	IA Marks	40
Nu. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 04			
COURSE OBJECTIVES : The objective of this course is to make students understand environmental management aspects in textile industries. This course enables the students to understand the significance of pollution control measures, quality of water and effluent treatment methods.			
MODULES		**Teaching Hours**	**Revised Bloom's Taxonomy (RBT) Level**

MODULE 1: Introduction to Environment Management. Scope and objectives, Benefits. Quality of Water. Water quality requirements for textile wet processing.	**10Hrs**	L1, L2
MODULE 2: **SEWAGE- DEFINITION-** characteristics of sewage, general methods of treatment of sewage, disposal of sewage. **INDUSTRIAL EFFLUENTS:** The disposal of industrial effluents in to streams. Characteristics of textile mill effluents, disposal and effect on the receiving streams.	**11Hrs**	L1, L2
MODULE 3: Noise pollution, causes of noise pollution, effects of noise pollution, remedial measures. Methods of noise control in textile mills. Brief discussion about different instruments used in analysis of effluents.	**10Hrs**	L1, L2, L3
MODULE 4: Brief discussion about different instruments used in analysis of effluents. Sources of pollution and its control. Various methods of industrial waste water treatment. Treatment of effluents received from textile wet processing industries.	**11Hrs**	L1, L2, L3, L4
MODULE 5: Filtration and filtration methods. Role of filter fabrics in pollution control. Indian pollution acts, their role and effectiveness. Recent developments in pollution control in various processes in textile mills and manufacturing plants.	**10Hrs**	L2, L3

COURSE OUTCOMES:
1. This subject helps the student to acquire the concepts of environmental management for textile industries.
2. This subject prepares the student apply environmental concept tools, pollution control norms and effluent control measures in textile/garment manufacturing industries
3. Students are exposed to environmental laws, EA systems, effluent treatment methods and concepts so that they apply these concepts in the actual work environment for maximum benefits.

Graduate Attributes (as per NBA)
➢ Engineering Knowledge
➢ Problem Analysis
➢ Design/development of solutions (partly)
➢ Interpretation of data

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

TEXT BOOKS:
1. Water Supply and sewage-Mc Graw Hill Publication
2. Waste Water Treatment- International Publication, M. N. Rao and A. K. Dutta
3. Waste Water Engg. Treatment Disposal Sewage- Tata Mc Graw Hill Publication
4. Pollution and its Control-Chand Publication

REFERENCES::
1. Efficient use of Fuel- H. M. S. D. Publication London 1958.
2. Energy Resources- Demand and Conservation with Special Reference to India, C. Kashjan

NON-WOVEN TECHNOLOGY
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VI

Subject Code	17TX653	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :
The objective of this Course is to make students understand the basics of nonwoven fabrics and various methods of manufacturing nonwoven fabrics and their uses and applications in various fields.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Introduction to non-woven fabrics, comparison with other fabric forming methods, Classification of non-woven (various approaches). Fibres used in non-wovens and their Characteristic features and properties of fibres.	**08 Hrs**	L1, L2
MODULE 2: MANUFACTURE OF NON-WOVENS: Dry methods- various methods of web preparation (opening, blending and cleaning machines used) technology used in production of parallel, cross-laid and random laid webs, web laying, machines. WET METHODS: principles and raw materials, web laying, concept of drift deposition.	**10 Hrs**	L1, L2
MODULE 3: Various methods of bonding web: Mechanical bonding introduction to needle punching, passage of material though needle loom, types of looms – The felting loom, Structuring loom, Random velour loom, Components of needle, needle action, Barb and its important parts kick-up, spacing, angle and depth, needle board arrangement of needle boards. Hydro-entanglement process and spun lace methods. Fabric structure and properties, uses and applications of needled fabrics. Stitch bonding. Thermal bonding: Principles of thermal bonding, types of binders and binder fibres , binding powder, binding web, Methods of thermal bonding: Hot calendaring, belt calendaring, Through air thermal bonding, infrared bonding, Ultrasonic bonding, spun bonding, melt blown processes.	**12 Hrs**	L1, L2, L3
MODULE 4: Chemical bonding: Introduction, properties desired in binder, bonding agents and their application, bonding	**12 Hrs**	L1, L2, L3, L4

mechanisms, factors influencing the process, conditions for providing necessary adhesions, various method of adhesive bonding. Saturation bonding, Foam bonding, Spray bonding, print bonding, powder bonding. FINISHING OF NON-WOVENS: Methods, dyeing and, printing, coating, lamination and special finishing techniques.		
MODULE 5: Non-woven fabric properties, testing of non-wovens. APPLICATION OF NON-WOVENS: A detailed study of application on non-wovens in medical field, home applications, shoes and leather industries, electrical industry. Applications as technical textiles in automobiles etc.	**10 Hrs**	L2, L3,L4

COURSE OUTCOMES:
On completion of this course, Students will be able to
1. Learn the various methods of manufacturing nonwoven fabrics
2. Gain knowledge about the machinery and Process Parameters of nonwoven fabrics.
3. Will be able to understand the wide applications of nonwoven fabrics.

Graduate Attributes (as per NBA)
  ➢ **Engineering Knowledge**
  ➢ **Problem Analysis**
  ➢ **Design/development of solutions (partly)**
  ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
  1. Non woven- Radkocroma, Textile Trade Press, Manchester, 1971.
  2. Non woven bonded fabrics- J.Lunenscoloss, et al, Ellis Hotwood, London, 1985.
  3. Needle Punching - Purdy, The Textile Institute, Manchester, 1960.
  4. Research Study on Needle Punched Fabrics- Subramanyam and Madhusudhanan, International Conference, 1.1. T Delhi, 1993.
  5. Needle punching - Mrstina and Tejqi, Elsevier, New-York,1990.

REFERENCES::
  1. International Seminar on Non-Woven Book of Papers Published by BITRA, 1990.
  2. Non-Woven in 71-John and Willey Eastern publications, 1960.
  3. Non -Woven Materials and Recent Developments- Gilies Noyes by Dara Corporation, New-Jersey, USA, 1979.
  4. Melt Blown Technique of Non Woven, Sanjeev Malkan, 1987.
  5. Non-Woven Manufacture -Prof.N.N. Banerjee.
  6. Non-Woven Manufacture -Encyclopedia of Textiles, Textile Institute, London.

PROCESS CONTROL IN WEAVING
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VI

Subject Code	17TX654	IA Marks	40
Nu. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04		
COURSE OBJECTIVES :		
The objective of this Course is to make students understand the basic concepts of process control techniques to apply them in weaving mills. They will be made to analyse and apply these process control tools in weaving production lines to maximize the productivity and profitability		
MODULES	**Teaching Hours**	**Revised Bloom's Taxonomy (RBT) Level**
MODULE 1: Scope for process Control, Systems of process Control in Weaving, Setting norms and schedule of checks, machinery audit, Quality Control in weaving – Yarn quality requirements for shuttle and shuttleless looms – Quality and performance in winding, warping, pirn winding, sizing and beam gaiting.	**11 Hrs**	L1, L2
MODULE 2: Process Control in weaving, – weaving package defects, causes and remedies – choice of size recipe – selection of weaving accessories – Quality studies and norms. Control of hard waste optimizing quality of preparation. Control of quality of knots, producing good package, control of productivity.	**11 Hrs**	L1, L2
MODULE 3: Process Control in weaving, – weaving package defects, causes and remedies – choice of size recipe – selection of weaving accessories – Quality studies and norms. Control of hard waste optimizing quality of preparation. Control of quality of knots, producing good package, control of productivity.	**10 Hrs**	L1, L2, L3
MODULE 4: Care in use and Selection of healds, Care in use and selections of Reads, Care in dressing of the beams for reducing incidence of cross ends, Fabric defects-causes-control measures. Inspection standards – cloth realization – value loss. Snap study in loom shed.	**10 Hrs**	L1, L2, L3, L4
MODULE 5: Process performance studies and norms. Ambient conditions in weaving. Factors affecting productivity in weaving – productivity indices – Loom efficiency: factors influencing loom efficiency – maximizing production and productivity in weaving, Establishment of productivity indices.	**10 Hrs**	L2, L3
COURSE OUTCOMES: 1. This subject helps the student to acquire the concepts of process control aspects of weaving. 2. This subject prepares the student apply process control tools to understand the weaving technology 3. Students are exposed to process control tools and techniques so that they apply these concepts in the actual work environment for maximum benefits.		
Graduate Attributes (as per NBA) ➢ Engineering Knowledge ➢ Problem Analysis ➢ Design/development of solutions (partly) ➢ Interpretation of data		
Scheme of Examination / Question paper pattern		

• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Textbooks
1. A System of Process Control in Weaving, ATIRA, Ahmadabad, 1983.
2. M. C. Paliwal and P. D. Kimothi, Process Control in Weaving, ATIRA Publication, Ahmadabad, 1983.

REFERENCES::
1. Lord P. R. and Mohamed M.H., "Weaving: Conversion of Yarn to Fabric", Merrow, 1992, ISBN: 090409538X
2. Ormerod A. and Sondhelm W. S., "Weaving: Technology and Operations", Textile Institute, 1995, ISBN: 187081276X
3. A. J. Chuter, Quality Management in the Clothing and Textile Industry, Woodhead Publishing,
UK, 4011.

TEXTILE TESTING LAB - I
[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Laboratory Code	17TXL66	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03

CREDITS – 02

Course objectives:
    The students are to learn the testing of various fibres and yarns for their various quality parameters. To learn operating instruments, settings, calibration, tabulation of test data, calculations, analysis of test results and drawing conclusions.

Laboratory Experiments: **NOTE: The experiments are to be carried using discrete components only.**	**Revised Bloom's Taxonomy (RBT) Level**
Fibre Tests: 1. Identification of textile fibres by using microscope.	L5, L6
2. Indentification of textile fibres by burning and chemical tests	
3. Determination of cotton fibre maturity by Causticaire method.	L2, L3, L4
4. Determination of fibre length parameters by Baer sorter	L5, L6
5. Determination of fibre fineness by Air-flow method.	L2, L3, L4
6. Determination of fibre strength using Stelometer.	L5, L6
7. Blend analysis by chemical methods.	L2, L3, L4
8. Determination of moisture content and regain of textile materials.	L2, L3, L4
Yarn Tests: 1. Determination of yarn count	

	L5, L6
2. Determination of single and ply yarn twist.	L5, L6
3. Determination of lea strength and CSP.	L5, L6
4. Determination of single yarn strength, elongation and RKM calculations.	L2, L3, L4
5. Determination of tensile strength of sewing threads.	L5, L6
6. Determination of yarn count, no. of twists, yarn ply and sewability of sewing threads.	L5, L6

Course outcomes:
1. Students are able to understand quality of fibres and yarns.
2. Students are able to test the materials using instruments and methods.
3. Students are able to tabulate the test results and learn calculation s involved.
4. Students are able to analyse the test results and draw conclusions

Graduate Attributes (as per NBA)
1. Engineering Knowledge related testing of fibres and yarns.
2. Problem Analysis related quality of fibres and yarns.
3. Design/Development of solutions for better evaluation of quality of textiles.

Conduct of Practical Examination:
1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

FASHION DESIGN AND GARMENT MANUFACTURE LAB
[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – VI

Laboratory Code	17TXL67	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03

CREDITS – 02

Course objectives:
Study about various sewing machines and tools and equipment used for measuring, marking and cutting for making a garment, and learn about accessories used in garment industry.

Laboratory Experiments: NOTE: The experiments are to be carried using discrete components only.	Revised Bloom's Taxonomy (RBT) Level
1. Introduction to Sewing machine.	L1, L2
2. Study of different types sewing machines	L1, L2, L3
3. Study of basic components of sewing machine.	L2, L3,

4. Study of different type's stitches and seams.	L3, L4
5. Study of tools and equipment used	L1, L2
6. Study of rule of proportions (Human body and Head Theory)	L1, L2,
7. Types of measurements. Techniques of body measurements.	L3, L4
8. How to take body measurements. Study of various buttons, labels and decorative materials for their characteristics and applications.	L2, L3, L4
9. Study of various buttons, labels and decorative materials for their characteristics and applications.	L2, L3
10. Practice of making a pattern of Bermuda and stitching	L4, L5, L6
11. Practice of making a pattern of men's shirt and stitching	L5, L6
12. Practice of making a pattern of salwar kameez and stitching	L5, L6
13. Practice of making a pattern of kids wear and stitching	L5, L6
14. Study and Practice of computer aided marker preparation for Men's, Women's and Children's Wear.	L6

Course outcomes:
- Students are able to understand the principle of working of different types sewing machines used in Industry.
- Students will learn how to take body measurement and draft the pattern and cutting.
- Students will learn the stitches, seams used to join the cut parts of garment.
- Students will learn to make individual patterns of men, women and kids garment.

Graduate Attributes (as per NBA)
- Engineering Knowledge.
- Problem Analysis.
- Design/Development of solutions.

Conduct of Practical Examination:
1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

FABRIC STRUCTURE AND DESIGN LAB - I
[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – VI

Laboratory Code	17TXL68	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03
CREDITS – 02			

	Revised Bloom's Taxonomy (RBT) Level
Course objectives: To learn analysis of fabrics and know their construction and manufacturing details. To know various design features and their aesthetic values. To understand the manufacturing requirements of fabrics with various basic designs. To understand the use of colours and colour combinations in the production of fabric designs.	
Laboratory Experiments: **NOTE: The experiments are to be carried using discrete components only.**	
1. Analysis of Plain wave fabrics	**L5, L6**
2. Analysis of Twill weave fabrics	**L2, L3, L4**
3. Analysis of Honey comb weave fabrics	**L2, L3, L4**
4. Analysis of Huck back weave fabrics	**L5, L6**
5. Analysis of Mock leno weave and other toweling fabrics	**L5, L6**
6. Analysis of Satin weave fabrics	**L2, L3, L4**
7. Analysis of Sateen weave fabrics	**L5, L6**
8. Creation of stripes and checks effect on paper using suitable colours	**L2, L3, L4**
9. Creation of floral design on paper by suitable colours	**L5, L6**
10. Creation of animation patterns and other designs on paper by suitable colours	**L5, L6**
11. Creation of suitable designs on dobby looms	**L5, L6**
12. Creation of suitable designs on jacquard	**L4, L5, L6**

Course outcomes:
Students learn the analysis of fabrics for construction details
Students to learn the analysis of manufacturing details
Students know the design features and production aspects

Graduate Attributes (as per NBA)
- Engineering Knowledge to design the fabrics.
- Problem Analysis.
- Design/Development of solutions.

Conduct of Practical Examination:
1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

SEMESTER – VII

APPAREL MARKETING AND MERCHANDISING [As Per Choice Based Credit System (CBCS) Scheme] SEMESTER - VII			
Subject Code	17TX71	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 04			

COURSE OBJECTIVES :

The objective of this course is to make students understand the basics of apparel Industry and Business concepts, understand the various marketing and merchandising responsibilities and strategies. To study about the analysis of garment and its standards, design and understanding about export marketing.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: **ORGANIZATION OF THE APPAREL BUSINESS -** Nature of Apparel, Organization of the Apparel Industry- Business Concepts Applied to the Apparel Industry- International Issues- Cooperation in Manufacturing and Distribution. **MARKETING OBJECTIVES AND STRATEGIES-** Functional organization of an apparel firm, responsibilities of marketing division strategic plan, marketing objectives & strategies, Retail and Wholesale Strategies of Merchandise Distribution-Labeling and Licensing.	11 Hrs	L1, L2
MODULE 2: **MERCHANDISING STRATEGIES & PROCESS-** Concepts apparel production lines, dimensions of product change, nature & timing of merchandising responsibilities, business & marketing plans, line planning, line development line presentation, sourcing. **ANALYSIS OF GARMENT DEVELOPMENT**- Role of garment analysis, process of garment analysis, professional perspectives on garment analysis.	11 Hrs	L1, L2
MODULE 3: **PRODUCT STANDARDS AND SPECIFICATIONS**: Sources of Product and Quality Standards-Standards for Quality, Fit, and Performance - Use of Specifications- Writing Specifications for Apparel Manufacturing. **APPAREL DESIGN**: Product Development and the Design Function- Role of Product Change in the Design Process- Post adoption Style. Development- Apparel Design Technology.	10 Hrs	L1, L2, L3
MODULE 4: **EXPORT MARKETING:** Outlook for export marketing, International agreement & agencies for promoting exports. Export import policy. Export assistance. Current pattern of India's foreign & world trade, Export barriers-tariff & non-tariff, Export	10 Hrs	L1, L2, L3, L4

Assistance.			
MODULE 5: Export marketing channels, physical distribution-transportation, packaging & marine insurance for exports. Management of risk & export financing, Quality control & pre-shipment inspection, documents for exports. An Introduction to retail marketing. Consumer behavior & retail operation. The retail marketing mix. Management of a retail brand. Application of IT in retail marketing.		**10 Hrs**	L2, L3

COURSE OUTCOMES:

On completion of this course, Students will be able to

1. Learn about Organization of the Apparel Industry and Business Concepts of Apparel Industry-
2. Gain knowledge about Marketing and Merchandising Strategies
3. Will be able to understand the basics garment analysis and Standards for Quality, Fit, and Performance
4. Will be able to understand the apparel design.
5. Able to understand about the apparel export marketing

Graduate Attributes (as per NBA)
  ➢ **Engineering Knowledge**
  ➢ **Problem Analysis**
  ➢ **Design/development of solutions (partly)**
  ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern

• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
  1. **Apparel Manufacturing -** Ruth E. Glock, Grace I. Kunz-**,** PHI Publication, UK
  2. **Export Marketing-** B.S.Rathore & J.S.Rathore, Himalaya Publishing house, Bombay, 1997

References::
  1. **The Technology of Clothing manufacture**-Herold Carr and Barbara Latham
  2. **Individuality**-Mary Kefgan, Phylliss Touchies Specht
  3. **Apparel Manufacturing and Sewn Product Analysis**-Ruth E Clock
  4. **Quality Control in Apparel Industry-**By Pradip V. Mehta
  5. **Fabulous fit**-By Judith Rashand
  6. **Marketing Management-**Phillip Kotler
  7. **Retail marketing management –** David Gilbert

TEXTILE TESTING - II
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VII

Subject Code	17TX72	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 04			

COURSE OBJECTIVES :

The objective of this course is to make students understand the importance of textile testing and quality control in textile industry. Students are trained to understand various methods and instruments used for testing of yarns, fabrics, garments and other accessories. Students are trained to test the yarns, fabrics, garments and other accessories for various properties, and calculate, analyse, compare and draw suitable conclusions.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Evenness of various textile strands such as sliver, roving & yarns – random variation, periodic variation, Index of irregularity, Variance- length curves and their importance, Methods of measurement of evenness, principles of various evenness testers & measurement of evenness. Mass variation diagram & spectrogram & its importance. Causes & effects of irregularity in textile strands. Yarn hairiness and its measurements.	**11 Hrs**	L1, L2
MODULE 2: Determination of fabric length, width, thickness, weight, thread density, and crimp. Determination of flammability, air permeability, and Thermal conductivity. Determination of fabric tensile, tearing and bursting strength.	**11 Hrs**	L1, L2
MODULE 3: Determination of stiffness, crease, drape, serviceability, wear, abrasion resistance and Pilling resistance.	**10 Hrs**	L1, L2, L3
MODULE 4: Water & fabric relationship. Study of water penetration, shrinkage test, wetting of apparels & industrial fabrics. Penetration of fabrics by water under pressure.	**10 Hrs**	L1, L2, L3, L4
MODULE 5: Fabric inspection - Assessment of fabric quality by fabric inspection, different methods of inspection and acceptance criteria. Study of fabric cyclic properties like bending, shear, fatigue. Estimation of color fastness of dyed fabrics.	**10 Hrs**	L2, L3

COURSE OUTCOMES:
On completion of this course, Students will be able to
1. Test yarns, fabrics and other accessories
2. Understand the methods and principles involved in testing
3. Use Instruments and understand their principle of working
4. Understand the quality parameters of textile materials
5. Tabulate test results, analyse and compare

Graduate Attributes (as per NBA)
1. Engineering knowledge related to quality
2. Understanding quality
3. Analysis of quality problems
4. Design/development of solutions
5. **Interpretation of test data**

Scheme of Examination / Question paper pattern
1. Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
2. Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Principles of Textile Testing,** Booth J. E., Butterworth, Wendon III Edition.
2. **Physical Textile testing of Textiles** - B.P.Soville, Wood Head-1999.
3. **Handbook of Textile Testing and quality Control,** Grover and Hamby, Wiley

Eastern Pvt Ltd, New Delhi 1969
4. **Physical properties of Textile Fibre,** Morton and Hearle, The Textile Institute, London.
5. **Skinkle, Textile Testing,** T.B. Tarapurwala Sons and Co. Pvt Ltd Bombay.
6. **BIS Handbook,** B I S Publication 1985.

References::
1. **Characteristics of raw cotton**, Textile Institute.
2. **Textile Testing Longmans,** James Lomax, Green and Co. London.
3. **B.S. Handbook**, B. S. Publication 1985.
4. **ASTM Standards**, ASTM Publication 1985.
5. **Handbook of Methods of Tests for cotton Fibres, Yarn and Fabrics**, CTRL, Bombay.
6. **Chemical Testing of Textiles,** Koch P., Chapman and Hall London.
7. **Cotton Assessment and appreciation,** SITRA, Coimbatore
8. **Physical Testing I and II,** Keshavan and others, SSMITT, Tamilnadu 1987.

FABRIC STRUCTURE AND DESIGN - II
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VII

Subject Code	17TX73	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :

The objective of this course is to make students to have a knowledge about special design features of various complicated and intricate design fabrics. Students are to learn analysis of these fabrics for their various construction particulars, manufacturing data and design details. Students are to understand the characteristic features of fabrics, design features and aesthetic qualities of different fabrics. Students will be able to understand the raw material requirements, machine and equipment for the production the fabric. Students understand the end uses of different fabrics and their suitability.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Welts & pique fabrics, weft wadded pique, figured pique Fabrics. Extra warp and extra weft fabrics. Backed weaves and fabrics.	**11 Hrs**	L1, L2
MODULE 2: Double cloths- Classification, selection criteria for threads, weaves etc., self-stitched double cloths, interchangeable double cloths. Center stitched double cloths.	**11 Hrs**	L1, L2
MODULE 3: Gauze and leno structures, principles of leno structure, basic sheds in leno structure, leno weaving with flat steel doupes with an eye, Russian cords design, simple net leno, Easing action shaker device. Principle of designing simple damask and brocades.	**10 Hrs**	L1, L2, L3
MODULE 4: Weft pile fabrics- allover or plain velveteen, corded velveteen, Warp pile fabrics produced with the aid of wires and by face to face principle.	**10 Hrs**	L1, L2, L3, L4

MODULE 5: Terry pile structures- formation of pile, terry weaves, figured terry pile fabrics. Narrow fabrics. Uncommon woven structures- Lappet & Swivel fabrics.	10 Hrs	L2, L3

COURSE OUTCOMES:
On completion of this course, Students will be able to
1. Learn various construction particulars and manufacturing data
2. Learn raw requirements and loom equipment required to produce the fabric.
3. Learn the analysis of complicated and intricate design features of various fabrics
4. Understand the suitability of these fabrics for particular end uses.

Graduate Attributes (as per NBA)
1. Engineering knowledge related fabric designing
2. Design analysis and aesthetic qualities
3. Design/development of traditional intricate designs
4. Interpretation of design details and development of new designs

Scheme of Examination / Question paper pattern
1. Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
2. Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Watsons Advanced Textile Design-** Z.J Grosicki, Universal Publishing Corporation, Bombay 1988

References::
1. **Grammar of Textile Design**-H. Nisbet, Taraporewala and Sons, 1985

STATISTICAL APPLICATIONS TO TEXTILES
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VII

Subject Code	17TX741	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 03

COURSE OBJECTIVES :
This Course aims at updating knowledge of students in following fields of statistical quality control
1. Concepts of statistics and quality control
2. Analyse the data, use suitable statistical tool to draw suitable conclusions
3. Comparing different processes, parameters etc for quality control

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: The concept of individual population and samples- Frequency distribution and its representation- Construction of frequency diagrams with applications, probability curves. Statistical measures and their practical applications. Measures of central tendency-different types of means, Measures of dispersion. Skewness, kurytosis	11 Hrs	L1, L2
MODULE 2:	11 Hrs	L1, L2

Random sampling errors, relations between samples and populations, confidence interval. Determination CI for means, SD and difference in mean and SD. The normal distribution, binomial and Poisson distributions.		
MODULE 3: Control charts, their uses and limitations in control of quality, concept of control limits, specification limits, ẌR, P, nP and C chart. Time series, setting up of trend line, components of time series trend line by straight line quadratic and exponential method.	**10 Hrs**	L1, L2, L3
MODULE 4: Test of significance. Setting up of hypothesis. Significant tests for means and dispersions, chi- square test.	**10 Hrs**	L1, L2, L3, L4
MODULE 5: Analysis of variance-One way & two way. Correlation and Correlation co- efficient. Regression Analysis	**10 Hrs**	L2, L3

COURSE OUTCOMES:
1. This course work prepares students to work in quality control department of spinning, weaving and garment manufacturing
2. This course work prepares students to analyze the data during their project work and case studies.

Graduate Attributes (as per NBA)
➢ **Engineering Knowledge**
➢ **Problem Analysis**
➢ **Design/development of solutions (partly)**
➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Textile Testing,**-J.E. Booth, CBS Publishers, New Delhi, 1996
2. **Handbook of Textile Testing and Quality control**- Hamby Grower, Wiley Eastern Pvt. Ltd. Delhi 1969.
3. **Practical Statistics for Textile Industry**-Part-1 & 2, Gave-Leaf, Textile Institute, 1984

References::
1. **A Textbook of statistics**, Rajamohan 1995
2. **Statistics For Textile Technologists-** L.H. C. Tippet, Textile Institute, Manchester 1973

FINANCIAL MANAGEMENT [As Per Choice Based Credit System (CBCS) Scheme] **SEMESTER - VII**			
Subject Code	17TX742	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 03			
COURSE OBJECTIVES : 1. To familiarize the students with basic concepts of financial management.			

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
2. To understand time value of money and cost of capital. 3. To analyze capital structure, capital budgeting and dividend decision. 4. To understand the short term and long term financing and working capital management		
MODULE 1: Finance function, goals of finance management, Financial planning, and Major financial decision areas. **Sources of Financing:** Shares, Debentures, Term loans, Lease financing, Hybrid financing, Venture Capital, Angel investing and private equity, Warrants and convertibles (Theory Only) Capital structure: measure of leverage, effects of lever - I, traditional approaches, MM theory of financial leverage and value of the forms. Designing of capital structure- EBIT- EPS analysis, risk-return trade-off.	**10 Hrs**	L1, L2
MODULE 2: Investment decisions– Capital budgeting process, Investment evaluation techniques – Net present value, Internal rate of return, Modified internal rate of return, Profitability index, Payback period, discounted payback period, accounting rate of return.	**10 Hrs**	L1, L2
MODULE 3: Capital structure: measure of leverage, effects of lever- I, traditional approaches, MM theory of financial leverage and value of the forms. Designing of capital structure- EBIT- EPS analysis, risk-return trade-off. Dividend policy**:** Factors affecting dividend policy relevance of the dividend policy- Walters model, Gordon's model- M.M. theory, and types of dividend policies- Bonus shares - corporate dividend policy in practice.	**10 Hrs**	L1, L2, L3
MODULE 4: Market for corporate securities, trading procedures in stock exchange, financial services, leasing, mutual funds, SEBI and market regulation. Working capital management, receivables, inventories and cash management, Merger and take-overs. Objects of costing**-**elements of costs, types of overheads, Allocation of factory over heads, Methods- determination of selling price. Definition and objects of depreciation-break-even analysis.	**11 Hrs**	L1, L2, L3, L4
MODULE 5: Definition and Advantages of Cost Accounting. Elements of cost. Introduction, classification, elements and allocation of Material cost. Labor cost and overhead cost. Process cost calculation**-** introduction, special features of Textile processing and its cost calculation. Introduction to standard costing and Budgetary control. Statutory guidelines on the maintenance of cost records.	**11 Hrs**	L2, L3
COURSE OUTCOMES: 1. Understand the basic financial concepts		

	2.	Apply time value of money		
	3.	Evaluate the investment decisions		
	4.	Analyze the capital structure and dividend decisions.		
	5.	Estimate working capital requirements		

Graduate Attributes (as per NBA)
- ➢ **Engineering Knowledge**
- ➢ **Problem Analysis**
- ➢ **Design/development of solutions (partly)**
- ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. Financial Management, Khan M. Y & Jain P. K, 6/e, TMH, 4011.
2. Financial Management, Rajiv Srivastava and Anil Misra, Second edition, Oxford University Press,4011
3. Financial Management - Prasanna Chandra, 8/e, TMH, 4011.
4. Financial Management, Shashi K Gupta and R K Sharma, 8th Revised Edition, Kalyani Publishers, -4014

References::
1. Financial Management, V K Bhalla ,1st Edition- S. Chand 4014,
2. Fundamentals of Financial Management, Brigham & Houston, 10/e, Cengage Learning.
3. Corporate Finance, Damodaran , 2/e, Wiley India (P) Ltd., 4004
4. Financial Management, Paresh P., Shah 2/e, Biztantra.

CAD/CAM IN TEXTILES
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VII

Subject Code	17TX743	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 03

COURSE OBJECTIVES :
The objective of this Course is to make students understand the use of computers and software packages for the development and production o of various textiles materials, fabrics and garments. To understand various possibilities of use of computer software for the development of fabric designs and garment designs. Students to learn the use of computers and software packages for the development of garment designing and fashion designing.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Introduction to computer - concepts of CAD / CAM. CAM in Garment Manufacturing. Complete pattern design system in preparation for grading, marker making and pattern manipulation. Computerized production pattern making - Hardware, software and system programming to produce a sample production pattern. Computer aided manipulation of pattern pieces to create individual styles.	**11 Hrs**	L1, L2

MODULE 2: Operation of garment CAD software. Computer used for purchase, inventory control and sales, computerization in quality control and production control.	**11 Hrs**	L1, L2
MODULE 3: Introduction to finite scheduling concept and fast react software. Creating product and order planning, updating. Eliminate late deliveries - General set up, allowances and matrices - Analyzing line balancing in different departments - control mechanisms - critical path and time tables.	**10 Hrs**	L1, L2, L3
MODULE 4: Computer controlled machinery for garment manufacturing - automated layout planning by various techniques. Algorithm for computer production garment parts - intelligent systems - 3D scanning technology.	**10 Hrs**	L1, L2, L3, L4
MODULE 5: Use of microcomputers for production control in garment industry. Imaging techniques for various designs. Development of robotics for CAM. EDI in garment technology. Concept of Enterprise Resource Planning (ERP) and computerization in exports /documentation.	**10 Hrs**	L2, L3

COURSE OUTCOMES:

On completion of this course, Students will be able to:
1. Learn the modern aspects of production of textiles
2. Explore the application of microprocessors and computers in textile manufacturing
3. Development of various fabrics designs by using computers and software
4. Calculations regarding raw material requirements, equipment and production planning etc.
5. Application of computers for colour measurement and to determine dye recipe.

Graduate Attributes (as per NBA)
1. Engineering Knowledge and computer application in textile designing and production.
2. Production/design problems analysis by computers and software.
3. Design/development of Computer aided design.
4. Interpretation of construction, design particulars.

Scheme of Examination / Question paper pattern
1. Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
2. Students have to answer five full questions choosing one full question from each module

Text Books:

1. Stephen Gray "CAD / CAM in clothing and Textiles", Gower Publishing Limited, 1998,
2. Compilation of papers presented at the Annual world conference Sep 26 -29, 1984 Hong Kong,
"Computers in the world of textiles", The Textile Institute, Manchester
3. W. Aldrich, "CAD in clothing and Textiles", Blackwell Science 2nd edition, 1992.

REFERENCES::

1. Jacob Solinger, "Apparel Manufacturing Handbook", Van no strand and Reinhold Company,
1960.

SMART TEXTILES

[As Per Choice Based Credit System (CBCS) Scheme] **SEMESTER - VII**			
Subject Code	17TX744	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 03			

COURSE OBJECTIVES :

1. Recall and Recognize smart technology for textiles and clothing.
2. Recognize and demonstrate the intelligent systems of incorporating the sensor, processor and the actuator into textiles.
3. Define, Recognize and demonstrate PCMs and their properties and uses.
4. Recognize and apply and analyze the functions and applications of smart textiles.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Smart technology for textiles and clothing – Introduction and Overview, development of smart technology for textiles and clothing – sensors/actuators, for signal transmission, processing and controls. Electrically active polymer materials – concepts of autonomic systems and materials, polymer materials as actuators or artificial muscle, peculiarity of polymer gel actuator, triggers for actuating polymer gels, electro-active polymer gels as artificial muscles, from electro-active polymer gel to electro-active elastomer with large deformation.	**12 Hrs**	L1, L2
MODULE 2: Introduction to phase change materials – Heat balance and thermo-physiological comfort, phase change technology, PCMs in textiles, textile treatment with PCM microcapsules, thermal performance, test methods, applications, future prospects of PCM in textiles and clothing. Intelligent textiles with PCMs – Basic information on PCMs, phase change properties of linear alkyl hydrocarbons, textiles containing PCM, Functions of Textile Structure with PCM.	**10 Hrs**	L1, L2
MODULE 3: Mode of PCM performance in clothing, Manufacturing of textiles containing micro PCMs, Applications of textiles containing PCMs are Domestic textiles, Medical products, Automotive textiles, Air conditioning buildings with PCMs. Tailor made intelligent polymers for biomedical applications- Introduction, Fundamentals aspects of shape memory materials, concepts of biodegradable shape memory polymers, degradable thermoplastics elastomers having shape memory properties, degradable polymer networks having shape memory properties.	**10 Hrs**	L1, L2, L3
MODULE 4: Embroidery and Smart textiles-Introduction, basics of embroidery technology-combined embroidery techniques,	**10 Hrs**	L1, L2, L3, L4

Embroidery machines, Embroidery for technical applications – tailored fibre placement, Embroidery technology used for medical textiles. Embroidered stamp – gag or innovation. Adaptive and responsive textile structures – Introduction, textiles and computing – the symbiotic relationship, the three dimensions of clothing and wearable information infrastructure, textiles and information processing, Georgia tech wearable motherboard,		
MODULE 5: Wearable technology for snow clothing. Bioprocessing for smart textiles and clothing - treatment of wool with enzymes, treatment of cotton with enzymes, enzymatic modification of synthetic fibres, spider silk, intelligent fibres. Textile scaffolds in tissue engineering – ideal scaffold system, scaffold materials, textile scaffolds.	**10 Hrs**	L2, L3,L4

COURSE OUTCOMES:

On completion of this course, Students will be able to

1. Learn the various aspects of smart and intelligent textiles.
2. Gain knowledge about the incorporation of smart elements in textile substrates.
3. Will be able to take up project and research work in emerging areas smart textile.

Graduate Attributes (as per NBA)
  - ➢ **Engineering Knowledge**
  - ➢ **Problem Analysis**
  - ➢ **Design/development of solutions (partly)**
  - ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern

• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.

• Students have to answer five full questions choosing one full question from each module

Text Books:
1. Smart fibres, fabrics and clothing, By Xiaoming Tao, Woodhead Publishing Limited, Cambridge, England.
2. Intelligent textiles and clothing, By H.R.Mattila, Woodhead Publishing Limited, Cambridge, England.

References::
1. Wearable electronics and photonics, By Xiaoming Tao, Woodhead Publishing Limited, Cambridge, England.
2. New fibres , By Tatsuya Hongu and Glyn O Phillips, Ellis Horwood, New York, London, Toronto, Sydney, Singapore.

TOTAL QUALITY MANAGEMENT [As Per Choice Based Credit System (CBCS) Scheme] **SEMESTER - VII**			
Subject Code	17TX751	IA Marks	40
Nu. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 03			

COURSE OBJECTIVES :

The objective of this course is to make students understand the concepts of total quality management and its applications in textile and garment industries. This will enable them to study the quality aspects related to textiles and garments and help them obtain maximum

benefits by applying TQM concepts in their work environment.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: **Introduction to TQM.** Quality movement in Japan, US & India. Definition of quality. Small q & Big Q, Quality characteristics - Views, Dimensions, Determinants. Quality & Profitability. **PRINCIPLES OF TOTAL QUALITY,** Evolution of total quality and control. **TQM -** Basic concepts & overview. Necessity of TQM. Elements of TQM, benefits of TQM, TQM in services, ISO 9000 & ISO 14000 in quality management system	11 Hrs	L1, L2
MODULE 2: **QUALITY & MANAGEMENT PHILOSOPHIES -** Deming Philosophy-Chain reaction, 14 points for management, triangle theory of variance, deadly diseases & sins, Deming's wheel. Juran's Philosophy - 10 steps for quality improvement, quality trilogy, universal breakthrough sequence. Crosby Philosophy-Crosby's 6 C's, Absolutes of quality, Crosby's 14 points for quality, Crosby triangle. Comparison of 3 major quality philosophies.	11 Hrs	L1, L2
MODULE 3: **MANAGING QUALITY**- traditional Vs Modern quality management, the quality planning, road map, the quality cycle. Cost of quality- Methods to reduce cost of quality, Sampling plans, O.C. curve. **QUALITY CONTROL -** Objectives of quality control, Strategy & policy. Company wise quality control. Quality Assurance- Definition, concepts & objectives. Economic models for quality assurance. Statistical methodology in quality assurance. Process capability ratio, 6 sigma in quality assurance.	10 Hrs	L1, L2, L3
MODULE 4: **FOCUSSING ON CUSTOMER-** Importance of customer satisfaction, Kano's model of customer's satisfaction, customers driven quality cycle, understanding customer's needs & wants, customer's retention. **LEADERSHIP-** Introduction, characteristics of quality leaders, role of TQM in leadership. Tools &Techniques of TQM, Just in time system-Concepts, objectives, overview, characteristics, benefits. Benchmarking - Introduction, process of bench marking, benefits, advantages & limitations.	10 Hrs	L1, L2, L3, L4

MODULE 5:	10 Hrs	L2, L3
SUPPLY CHAIN MANAGEMENT- Objectives, process tools, supply chain management for manufacturing organization & service organization. **World class manufacturing** - becoming world class, relevance of TQM in world class manufacturing. World class supplier, world class customer, present global business conditions, world class companies in 21st century.		

COURSE OUTCOMES:
1. This subject helps the student to acquire the concepts of total quality management tools
2. This subject prepares the student apply TQM concepts in textile/garment manufacturing industries
3. Students are exposed to TQM principles and concepts so that they apply these concepts in the actual work environment for maximum benefits.

Graduate Attributes (as per NBA)
- ➢ Engineering Knowledge
- ➢ Problem Analysis
- ➢ Design/development of solutions (partly)
- ➢ Interpretation of data

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

1. Total Quality Management- K. Shridhara Bhat Himalaya Publishing House**,** 4010

 References:
1. **Norms For Spinning-**Weaving and Processing, ATIRA Publication, Ahmadabad 1990
2. **Handbooks manuals** – BIS, ASTM, ISO-9000
3. **Total Quality Management**- N.V.R. Naidu, K.M. Babu, G. Rajendra, New age international publishers

RETAIL MANAGEMENT
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VII

Subject Code	17TX752	IA Marks	40
Nu. Of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 03

COURSE OBJECTIVES :
- To develop an understanding of the contemporary retail management, issues, strategies and trends.
- To highlight the importance of retailing and its role in the success of modern business.
- To acclimatize with the insights of retailing, key activities and relationships

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Introduction and Perspectives on Retailing World of Retailing, Retail management, introduction, meaning, characteristics, emergence of	**10Hrs**	L1, L2

organizations of retailing - Types of Retailers (Retail Formats) - Multichannel Retailing - Customer Buying Behaviour, Historical Perspective, role of retailing, trends in retailing, FDI in Retail - Problems of Indian Retailing - Current Scenario		
MODULE 2: Marketing**:** Retailing, Role, Relevance & Trends. Retail Customer, Retail market segmentation &franchising, Relationship marketing in Retailing., Social Marketing in Retail management Strategic management**:** Retail in India, Services marketing and Management, International/Strategies, Pricing, Advertising & sales promotion.	**11Hrs**	L1, L2
MODULE 3: Retailing strategy for Setting up Retail organization and planning**:** Retail Market Strategy - Financial Strategy - Site & Locations (Size and space allocation, location strategy, factors Affecting the location of Retail, Retail location Research and Techniques, Objectives of Good store Design.) – Human Resource Management, Information Systems and supply chain management & Logistics. Retail Pricing and Promotion**:** Factors influencing retail pricing, Retail pricing strategies, Retail promotion strategies.	**11Hrs**	L1, L2, L3
MODULE 4: Store Management and Visual Merchandising**:** Store Management: Responsibilities of Store Manager, Store Security, Parking Space Problem at Retail Centers, Store Record and Accounting System, Coding System, Material Handling in Stores, Management of Modern retails –Store Layout, design: Types of Layouts, role of Visual Merchandiser, Visual Merchandising Techniques, Controlling Costs and Reducing Inventories Loss, Exteriors, Interiors Customer Service, Planning Merchandise Assortments -Buying systems-Buying merchandise and Retail Communication Mix.	**10Hrs**	L1, L2, L3, L4
MODULE 5: Retail Audit and ethics in Retailing: Undertaking an audit, responding to a retail Audit, problems in conducting a retail audit. Ethicsin retailing, social responsibility and consumerism Retail Life Cycle – Innovation / Acceleration / Maturity / Decline, Multi-Channel Retailing.	**10Hrs**	L2, L3

COURSE OUTCOMES:
- Find out the contemporary retail management, issues, and strategies.
- Evaluate the recent trends in retailing and its impact in the success of modern business.
- Relate store management and visual merchandising practices for effective retailing.

Graduate Attributes (as per NBA)
- ➢ **Engineering Knowledge**
- ➢ **Problem Analysis**
- ➢ **Design/development of solutions (partly)**
- ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. Retail Management- A strategic Approach, Alibris, Prentice Hall, Mar., 4006
2. First Steps In A Retail Career, Wrice Mark, Macmillan Publishers Australia P/L
3. Communicating with Customers, Euson, B, Jacaranda Wiley
4. Retail Management, Levy and Weitz, McGraw Hill
5. Retail Management - Chetan Bajaj, Oxford University press
6. Retail Marketing Management - Dravid Gilbert, 2/e, Pearson Education
7. The Art of Retailing - A. J. Lamba, McGraw Hill.

References:
1. Marketing Management, R. Saxena
2. Integrated Retail Management - James R. Ogden & Denise Trodden, Biztantra, Latest Edition.
3. Principles of Retail Management - Rosemary Varley, Mohammed Rafiq, Palgrave Macmillan, 4009.
4. Managing Retailing - Sinha, Piyush Kumar &Uniyal& Oxford University Press, 4010.
5. Retailing Management - Swapna Pradhan, 4/e, TMH, 4012.
6. Retail Management: A Strategic Approach - Barry Berman, Joel R. Evans, Pearson.
7. Retail Management, Functional Principles and Practices, Gibson G Vedamani, 4th Edition, JAICO Publishing House

INDUSTRIAL ENGINEERING
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VII

Subject Code	17TX753	IA Marks	40
Nu. Of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 03

COURSE OBJECTIVES :
The objective of this course is to understand the importance of Industrial engineers and industrial engineering department in Textile and Garment Industry. This course will enable the students to get familiarized with plant location, layout, work study and time study concepts.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Importance of Industrial Engineering department in Textile and Garment Industry. Position of Industrial Engineering department in industry. Management, Administration and organization. Professional and scientific management. Difference between management and administration. Study of different types of organization.	**11 Hrs**	L1, L2
MODULE 2: Plant location and Plant layout. Definition of plant location. Factors influencing the plant location. Types of plant location and their advantages and limitations. Plant layout. Definition of Plant layout. Objects of	**11 Hrs**	L1, L2

Scientific layout. Principles of Layout. Types of layout and their detailed study		
MODULE 3: Work study and its importance definition of work-study. Success of organization through work-study technique. Objects of work study. Problems of work study. Method study and its objects. Steps of method study and detailed study of each step. Determination of new method to complete each activity in industry	**10 Hrs**	L1, L2, L3
MODULE 4: Time study. Definition of Time study and its objects. Detailed study of each steps of Time study. Determination of Normal time, Observed time and Standard time. Study of different types of allowances. Study of Decimal minute stop watch for recording all the activities	**10 Hrs**	L1, L2, L3, L4
MODULE 5: **PLANNING AND FORECASTING:** Planning and its concept in industry. Detailed study of TEAM work, SMART and POSDCORB and SWOT analysis. Production planning and Control (PPC). Importance of PPC and its detailed study in Industry. Study of Value of money, Inflation and Deflation currency, Supply and Demand factor and its impact on society	**10 Hrs**	L2, L3

COURSE OUTCOMES:
On completion of this course, Students will be able to:
1. Learn the importance of Industrial engineering department
2. Gain knowledge about the position of industrial engineering department
3. Will be able to understand the concept of this scientific tool

Graduate Attributes (as per NBA)
- ➢ **Engineering Knowledge**
- ➢ **Problem Analysis**
- ➢ **Design/development of solutions (partly)**
- ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. R.PaneerSelvam, Production and Operations Management, Prentice Hall of India, 4002.

2. Sang M Lee and Marc J Schniederjans, Operation Management, All India Publishers and Distributors, First Indian edition 1997.
3. Robert H. Lowson, Strategic operations Management (The new competitive advantage), Vikas Publishing House, First Indian reprint 4003.

References::
1. Thomas E Morton, Production and operations management, Vikas Publishing House, First Indian reprint 4003.
2. Mahapatra P B, Computer Aided Production Management, Prentice Hall of India, 4001.

3. Martand T Telsang, Production Management, S Chand and Company, First edition 4005.

ELEMENTARY MECHANICS OF TEXTILE STRUCTURES
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VII

Subject Code	17TX754	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

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CREDITS - 03

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COURSE OBJECTIVES :

The objective of this course is to make students to understand the basic structural properties of yarns and fabrics and to assess them for required end uses.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Elements of yarn geometry - and their application. Geometry of folded yarns. Yarn diameter and density. Theories of yarn strength	**11 Hrs**	L1, L2
MODULE 2: Characteristics of spun and continuous filament yarn Detailed study of Concept of blend irregularity, and elongation balance.	**11 Hrs**	L1, L2
MODULE 3: Determination of cover factor and its application. Geometry of plain weave fabrics and their applications. Crimp interchange in woven fabrics.	**10 Hrs**	L1, L2, L3
MODULE 4: Introduction to fabric deformation in tension, bending and shear. Simple geometry of knit structures.	**10 Hrs**	L1, L2, L3, L4
MODULE 5: Simple mechanics of non-woven structures. Study of Properties of non-woven fabrics and their application.	**10 Hrs**	L2, L3

COURSE OUTCOMES:

On completion of this course, Students will be able to:

1. Learn the various Yarn and Fabric Geometrical structures
2. Gain knowledge Geometrical and Dimensional properties of Yarns and Fabrics
3. Will be able to understand the assessment of yarn and Fabric quality

Graduate Attributes (as per NBA)
 ➢ **Engineering Knowledge**
 ➢ **Problem Analysis**
 ➢ **Design/development of solutions (partly)**
 ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern

• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.

• Students have to answer five full questions choosing one full question from each module

Text Books:

1. **Manual of Cotton Spinning**, Coulson. A.F.W. (Ed.), Vol. I to IV, Textiles Institute, Manchester, 1958.
2. **Series on Textile processing,** Zaloski. S. Tp - Institute of Textiles Technology USA Vol.I (Opening, Cleaning and Picking).
3. **Technology of short-staple spinning,** Klein. W., Vol.I, II, III and IV, Textile Institute Pub.,Manchester 1989.
4. **Spun Yarn Technology,** Oxtoby, Butterworths, London, 1987.

References::

1. **Contemporary Textile Engineering,** Happey. F. (Ed.) Academic Press Inc., 1981.

2. **Hand book of Cotton Spinning,** William Taggart., UniversalPubl corp. 1979.
3. **Essential Facts of Practical Cotton Spinning**, Pattabhiraman. T.K., Soumya Pub., Bombay 1979.
4. **Cotton Spinning Calculations**, Pattabhiraman. T.K., Soumya Pub., Bombay 1979.
5. **Cotton Opening & Carding,** Merril G.R., Pub: G.R. Merill, Lowell Mass, 1955.
6. **Blowroom and carding** NCUTE Pilot programme.

TEXTILE TESTING LAB-II
[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Laboratory Code	17TXL76	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03

CREDITS – 02

Course objectives:
The students are to learn the testing of various yarns and fabrics for their various quality parameters. To learn operating instruments, settings, calibration, tabulation of test data, calculations, analysis of test results and drawing conclusions.

Laboratory Experiments: NOTE: The experiments are to be carried using discrete components only.	Revised Bloom's Taxonomy (RBT) Level
1. Determination of yarn evenness by visual examination.	L5, L6
2. Determination of evenness of sliver, roving and yarn.	L2, L3, L4
3. Determination of geometrical properties of fabrics.	L2, L3, L4
4. Determination of Air Permeability of fabrics	L5, L6
5. Determination of crease recovery property of fabrics.	L5, L6
6. Determination of drape co-efficient of fabrics.	L2, L3, L4
7. Determination of fabric stiffness and its parameters	L5, L6
8. Determination of fabric strength and elongation.	L2, L3, L4
9. Determination of fabric tearing strength.	L2, L3, L4
10. Determination of fabric bursting strength.	L5, L6
11. Determination of abrasion resistance of fabrics.	
12. Determination of pilling tendency of fabrics.	L5, L6
13. Determination of colour fastness of dyed and printed fabrics for washing	L5, L6
14. Determination of colour fastness of dyed and printed fabrics for perspiration.	L2, L3, L4
15. Determination of dimensional stability of fabrics.	L5, L6

16. Determination of fastness properties of dyed fabric for artificial light and sun light.	L2, L3, L4
17. Determination of Fastness Properties of printed and dyed fabric for rubbing.	L5, L6

Course outcomes:
1. Students are able to understand quality of fibres and yarns.
2. Students are able to test the materials using instruments and methods.
3. Students are able to tabulate the test results and learn calculation s involved.
4. Students are able to analyse the test results and draw conclusions

Graduate Attributes (as per NBA)
1. Engineering Knowledge related testing of yarns and fabrics.
2. Problem Analysis related quality of yarns and fabrics.
3. Design/Development of solutions for better evaluation of quality of textiles.

Conduct of Practical Examination:
1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

FABRIC STRUCTURE AND DESIGN LAB-II
[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – VII

Laboratory Code	17TXL77	IA Marks	40
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	60
		Exam Hours	03

CREDITS – 02

COURSE OBJECTIVES:
To learn the analysis of fabrics with complicated designs and know their construction and manufacturing details. To know various complicated design features and their aesthetic values. To understand the manufacturing requirements of fabrics with various complicated and intricate traditional designs. To understand the use of colours and colour combinations in the production of fabric designs.

Laboratory Experiments: **NOTE: The experiments are to be carried using discrete components only.**	**Revised Bloom's Taxonomy (RBT) Level**
1. Analysis of dobby design fabrics.	L5, L6
2. Analysis of fancy woven design fabrics.	L2, L3, L4
3. Analysis of jacquard design fabrics.	L2, L3, L4
4. Analysis of printing design fabrics.	L5, L6
5. Generating of geometric, abstract, floral, animation and combined designs.	L5, L6

6. Application of paint brush and other related software in colour mixing.	L2, L3, L4
7. Utilization in design software for creating textile designs intended for dobby.	L5, L6
8. Utilization in design software for creating textile designs intended for jacquard.	L2, L3, L4
9. Utilization in design software for creating textile designs intended for printing.	L2, L3, L4
10. Simulation of fabric appearance of woven designs by varying fabric set and yarn count.	L5, L6
11. Analysis of colour and weave fabrics and simulating the appearance using computer.	L5, L6
12. Scanning of fabric and simulating the appearance of the same.	L5, L6
13. Scanning of yarn and imitating the appearance of a yarn in woven fabric form.	L2, L3, L4
14. Transformation of design to production particulars	L5, L6

Course outcomes:
1. Students learn the analysis of fabrics for construction details
2. Students to learn the analysis of manufacturing details
3. Students know the design features and production aspects

Graduate Attributes (as per NBA)
1. Engineering knowledge.
2. Problem Analysis.
3. Design/Development of solutions.

Conduct of Practical Examination:
1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
4. Change of experiment is allowed only once and 17% Marks allotted to the procedure part to be made zero.

SEMESTER – VIII

APPAREL TESTING AND QUALITY CONTROL
[As Per Choice Based Credit System (CBCS) Scheme]

SEMESTER - VIII			
Subject Code	17TX81	IA Marks	40
Nu. Of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03
CREDITS - 04			

COURSE OBJECTIVES :

The objective of this course is to make students understand the importance of textile testing and quality control in the manufacture of apparels in apparel industry. Students are trained to understand various methods and instruments used for testing/inspection of fabrics, garments and other accessories. Students are to study testing of the yarns, fabrics, garments and other accessories for various properties,

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Thermal comfort properties, moisture-vapour transmission, liquid-moisture transmission, air-permeability, aesthetic comfort, static electricity. Abrasion resistance, tensile and tearing strength, launder ability, seam – slippage. Seam strength, methods of measurement of seam strength and seam efficiency.	**11Hrs**	L1, L2
MODULE 2: Low - stress mechanical properties, formability, tailor ability, sewability etc. Fabric handle by KESF and FAST systems, Fabric handle & application of test results in garment manufacturing. Crease resistance properties, anti - shrink, pilling resistance behavior – role of fibre properties and chemical treatments.	**11Hrs**	L1, L2
MODULE 3: Fabric stability and finished width. Fabric inspection methods and acceptance criteria. **L**aying-up and cutting, basic technology of seams, Stitch forming action, defects in laying, cutting, seaming & sewing operations.	**10Hrs**	L1, L2, L3
MODULE 4: Colour fastness properties of fabric. Seeing colour and the effect of type of illuminant on the apparent shade of a sample, Effects of intensity, angle of illumination and type on the apparent shade of a sample, Effects on shade of other colours in adjacent areas. Quality control in the sampling/development department. Examples of garment specification, Seam specification examples, Performance specification.	**10Hrs**	L1, L2, L3, L4
MODULE 5: The cost of quality, Functions of Quality Assurance, Commercial advantages form effective control systems, Economic aspects of quality assurance, role of quality control. Dynamic Inspection - Inline, Production & Final Quality Inspection, Product Safety Evaluation, Sampling & Quality Control, Testing & Evaluation - Fast Durability Evaluation, Production & Delivery Monitoring, Platform Quality Inspection Services	**10Hrs**	L2, L3

COURSE OUTCOMES:

On completion of this course, Students will be able to

    1. Testing of yarns, fabrics and other accessories

2. Method and principle involved in inspection/testing of fabric, zippers, buttons, sewing threads etc.
3. Instruments used and the principle of working
4. Understand the quality parameters of textile materials

Graduate Attributes (as per NBA)
1. Engineering knowledge related to apparel production
2. Problem analysis, such as design faults, fabric defects etc.
3. Design/development of various types of garments and
4. Interpretation of design of garments to suit particular end use

Scheme of Examination / Question paper pattern
1. Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
2. Students have to answer five full questions choosing one full question from each module

Text Books:
1. **"Principles of Textiles testing",** J.E. Booth.
2. **"Hand book of textile testing and quality control",** B. Glover, D.S. Hambi-Pu Wiley Eastern.Ltd., Bangalore.
3. **"The measurement of Appearance",** Richard S. Hunter and Richard W. Harold, Wiley Inter Science.
4. **"An introduction to quality control for the apparel industry",** Pradip. V. Mehta.

References:
1. **"International Apparel Quality manuals",** KES- F and FAST manuals.
2. **"Progress in Textile science and technology",** Vol-1, Ed. V.K. Kothari, IAFL, India 4000.

TECHNICAL TEXTILES
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VIII

Subject Code	17TX82	IA Marks	40
Nu. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 04

COURSE OBJECTIVES :
The objective of this Course is to make students understand:
1. Basics of technical textiles
2. Different types of technical textiles
3. Various fibres and fabrics used for production of technical textiles
4. Various applications of technical textiles in industries

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: **INTRODUCTION TO TECHNICAL TEXTILES**. Requirements of fibres, yarns and fabrics for technical textiles. Classification of technical textiles. Study of properties of various fibres used for technical textiles. **AGROTECH:** Textiles used for agriculture, Horticulture and animal husbandry. **MOBIL TECH - AUTOMOTIVE TEXTILES** - Use of textiles in tyres, requirements of fibres used for	11Hrs	L1, L2

tyres, various fibres used for tyre cords, tire building, different types of tyres. Upholstery in automobiles: vehicle top covers, seat covers, headliners, carpets etc. Safety devices in automobiles: seat belts, airbags, helmets etc. Textiles used in Aerospace industry.		
MODULE 2: **MEDICAL TEXTILES:** Medical application of Textiles, requirements, classification, detailed study of application of textiles in implantable, non-implantable, extra corporal devices and health care hygienic products. **GEO TEXTILES:** Definition, textile fibres and fabrics used, functions of geo-textiles. Applications of geo-textiles and geo-membranes in civil engineering i.e. roads, railways, bridge, dam construction, soil erosion etc.	**10Hrs**	L1, L2
MODULE 3: **TEXTILES IN FILTERATION:** Introduction, types of filtration requirements, filtration mechanisms, Effect of yarns and fabric construction on filtration. Methods/types of filtration. **COATED FABRICS:** Introduction, chemistry of coated textiles, thermoplastic polymers for coating, coating techniques, fusible interlining.	**10Hrs**	L1, L2, L3
MODULE 4: **SMART TEXTILES:** Introduction, concept of smart textiles, various application of smart textiles. Introduction to nanotechnology in textiles. Application of nanotextiles in various field. Production and properties of nanofibres.	**10Hrs**	L1, L2, L3, L4
MODULE 5: **TEXTILES IN DEFENSE:** Introduction, historical back ground, criteria for modern military textiles, textiles for environmental protection, Ballistic protective materials, water proof materials, application of textiles in camouflage. Application of Textiles in Packing, Power transmission, fish nets, sports.	**11Hrs**	L2, L3

COURSE OUTCOMES:
4. This subject helps the student to acquire knowledge of various technical textiles used in industries
5. This subject prepares the student work in technical textile manufacturing industry.
6. Students are exposed to research field in technical textiles and their applications in various industries.

Graduate Attributes (as per NBA)
➢ Engineering Knowledge
➢ Problem Analysis
➢ Design/development of solutions (partly)
➢ Interpretation of data

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

TEXT BOOKS:

1. **Hand book of Technical Textiles**- Ed. A.R.Horrocks, S.C, Anand. Wood Head Pub., England,4000.
2. **Hand book of Industrial Textiles-** Ed S. Adanur, Technomic Pub., Lancaster-Basel, 1995.
3. **Smart Fibres - Fabrics & Clothing-**Ed. Xiaoming Tao, Wood Head, England, 4001.
4. **Design of Textiles For Industrial**- Applications, ED P.W. Harrison, Pub Textile Institute 1977Manchester

Reference:
1. **Handbook of Industrial Textiles**-e. R. Kaswell, Pub Willington, New York 1963
2. **Industrial Textiles-** P.K.Badami.
3. **International Seminar on Technical Textiles** -by SASMIRA, 4000.

FIBRE REINFORCED COMPOSITES
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VIII

Subject Code	17TX831	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 03

COURSE OBJECTIVES :
This Course aims at updating knowledge of students in following fields of FRCS.
1. Basic concepts of FRCS, comparison metals and FRCS, various term used in FRCS
2. Different raw materials used for detailed technology of manufacturing FRCS
3. Testing, analysis and detailed application FRCS

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Introduction to composites. Basic nomenclatures – reinforcing phase, continuous phase, matrix, interface etc. Classification of composites with respect to fibre used, matrix used, limitations of engineering metals. Meaning of bio composites, advantages of bio composites. 3D fabrics for composites.	**11 Hrs**	L1, L2
MODULE 2: Study of mechanical & thermal properties various fibres Viz. Carbon, glass, silicon carbide, boron, kevlar, polyethylene, thiozole etc. used in the production of fibre reinforced composites. Study of major natural fibres (coir, jute) which are used in the production of fibre reinforced composites. Advantages and disadvantages of natural fibres used in composites. Classification of resins, thermoset, thermoplastic metal matrix and their production properties, advantages, disadvantages (phenolic, epoxy, polyester, vinyl esters)	**11 Hrs**	L1, L2
MODULE 3: Composites manufacturing techniques**-**Introduction-Meaning of interphase, types of bond set interphase, meaning of lamina, laminates, and representation of laminates. Prepreg technology, Hand lay-up-spray-up -filament winding. Compression moulding, injection moulding, poltrusion	**10 Hrs**	L1, L2, L3

techniques. Brief outline of mechanical and thermal properties of various composites viz. Glass, boron, carbon, aramid.				
MODULE 4: Brief outline on testing of composites - Characterization of physical constituents of composites - composite density, fibre volume fraction, void content. Testing of tensile strength of composites, 3 & 4 point bending of composites, comparison testing of composites. NDT tests of composites. Composite mechanics-failure mechanism in composites. Derivations of various equations related to composite structures viz. Axial modulus, transverse modulus, breaking strength of continuous filament, reinforced composites, effect of volume of fibres on mechanical properties of fibre reinforced composites. Fatigue and creep process in fibre reinforced composites.		**10 Hrs**		L1, L2, L3, L4
MODULE 5: Study of various applications of composites mainly in the field like Aeroplane, aerospace, medical, sports, ship building automobiles and industries.		**10 Hrs**		L2, L3

COURSE OUTCOMES:
1. This course prepares students to understand unconventional application textile fibres
2. Students will be able to take up research work in fields of high performance fibres and material science
3. Students can make their career in DRDO, NAL and other defense related areas

Graduate Attributes (as per NBA)
  ➢ **Engineering Knowledge**
  ➢ **Problem Analysis**
  ➢ **Design/development of solutions (partly)**
  ➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. **Fibre Reinforced Material Technology-**N.J.Parratt Van Nostrand Reinhold Co, Inc 1972
2. **High Performance Fibre Composites-** J.H.Morely, Academic Press
3. **Composite materials**:- Krishan K. Chawla, Springer 4005
4. **High Performance Fibres:-** J.W.S. Hearle, Woodhead UK 4005

References:
1. **DST-polymers and composites-Recent trends-Proceedings of National Seminar**1989, OxfordIBH Pub Co Pvt. Ltd.
2. **Composites Engineering Hand Book** - Ed. Mallik P.K., Marcell Dekker, N.Y., 1997.

HUMAN RESOURCE MANAGEMENT				
[As Per Choice Based Credit System (CBCS) Scheme]				
SEMESTER - VIII				
Subject Code	17TX832	IA Marks		40
No. of Lecture Hours/Week	04	Exam Marks		60
Total Number of	52	Exam Hours		03

Lecture Hours			

<div align="center">**CREDITS - 03**</div>

COURSE OBJECTIVES :
1. To understand the HRM concepts and theory
2. To obtain an overview of various HRM functions and practices
3. To gain an insight into the various statutory provisions

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Human Resource Management: Introduction, meaning, nature, scope and objectives of HRM, Difference between Personnel management and HRM - Importance and Evolution of the concept of HRM - Major functions of HRM - Principles of HRM and impact on Textile Industry	**10 Hrs**	L1, L2
MODULE 2: Environment and Strategies of HRM: Introduction, Strategic management process, Organizational and human resource strategies. Job design, Job analysis, Job description and job specifications. Uses of job analysis Human Resource Planning: Introduction, process of HRP and HRP at different levels.	**10 Hrs**	L1, L2
MODULE 3: Recruitment: Definition, Constraints and Challenges, Sources and Methods of Recruitment. Selection: Definition and Process of Selection. Placement, Induction. Significance, Need, Objectives, Scope and Concept of Human Resource Development	**11 Hrs**	L1, L2, L3
MODULE 4: Training: Definition, Stages of training personnel for higher performance and productivity. Different types of evaluation, basis of promotion, demotion, transfers. Advantages and disadvantages of line and group performance in garment Industries. Performance Appraisal: Meaning, need of Performance Appraisal, Concept of Performance Appraisal, the Performance evaluation, Methods of Performance Appraisal	**11 Hrs**	L1, L2, L3, L4
MODULE 5: Employee Grievances: Employee Grievance procedure, Grievances Management in Indian Industry. Discipline: Meaning, approaches to discipline, essential of a good disciplinary system. Recent trends in HRM: Employer's brand, Competency mapping, Business process outsourcing (HR issues). Knowledge management meaning and benefits, Beckmans knowledge management process.	**10Hrs**	L2, L3

COURSE OUTCOMES:
- Synthesize information regarding the effectiveness of recruiting methods & selection procedures
- Identify the various training methods and design a training program
- Knowledge of designing job description and job specification for various levels of employees.

Graduate Attributes (as per NBA)

➤ **Engineering Knowledge**		
➤ **Problem Analysis**		
➤ **Design/development of solutions (partly)**		
➤ **Interpretation of data**		

Scheme of Examination / Question paper pattern

• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.

• Students have to answer five full questions choosing one full question from each module

Text Books:

1. Human Resource Management and Industrial Relations - Dr. P. Subba Rao
2. Personal Management- Edvin B. Flippe
3. Human Resources Management: A South Asian Perspective, Denski/Griffin/Sarkar-Cengage Learning, 4012.
4. Human Resource Management – Rao V. S. P, Excel BOOKS, 4010
5. Personal Management- Subratha Ghosh.
6. Human Resource Management - Lawrence S. Kleeman, Biztantra , 4012.
7. Human Resource Management – Dr. T.P RenukaMurthy HPH
8. Personal Management- Duck Torington

References:

1. Management of personnel in India– N.N Chatterjee
2. Human Resource Management - John M. Ivancevich, 10/e, McGraw Hill.
3. Human Resource Management in practice - Srinivas R. Kandula, PHI, 4009
4. Managing Human Resources - Luis R Gomez-Mejia, David B. Balkin, Robert L. Cardy,6/e, PHI, 4010.
5. Human Resource Management & Industrial relations, P. Subba Rao, Himalaya Publishing House, Mumbai.
6. Human Resource Management – Aswathappa K HPH

CLOTHING CULTURE AND COMMUNICATION
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VIII

Subject Code	17TX833	IA Marks	40
No. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 03

COURSE OBJECTIVES :

The objective of this Course is to make students understand the basics of clothing culture and its importance and to understand the various costume history of western and Indian civilization and communication through clothing.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: Introduction to clothing, why do people wear clothes: Protection, Modesty, Adornment Identification, Status, Individuality, Personality, Introduction to fashion: Definition of fashion, when and wear of fashion, what differentiate fashion from Non fashion, are their societies without fashion, how did fashion develop in Europe, why not everyone wears fashion, why does fashion change. Introduction to culture, Introduction to communication. Fashion: What is fashion? Function of fashion, ethnic fashion, fashion and anti-fashion, flow of fashion,	**12 Hrs**	L1, L2

fashion life cycle, diffusion of innovations, fashion leaders and followers, characteristics and influencing factors, social change and fashion, appearance and identity culture, observer and wearer.		
MODULE 2: Fashion and Image: Expression of personality "The true self" putting across an image, self-presentation in everyday life different impressions in different situations. Fashion and society: Role of fashion in society, Impact of fashion on society, importance of fashion in our society, benefits of fashion. Revolutions and tensions, impact of World War on the society, French revolution, Industrial revolution.	**10 Hrs**	L1, L2
MODULE 3: History of Costume: Western civilization, Byzantine Fashion, Medieval fashion, Renaissance fashion, Tudor and Elizabethan fashion, Roman Fashion, Greek fashion, Minoan fashion, Egyptian fashion. Fashion and clothing systems.	**10 Hrs**	L1, L2, L3
MODULE 4: Indian culture and costume: Introduction to Indian clothing, Different types of sarees, Dhoti and Lungi, Punjabi Suits and Purdah, Different types of head gears and caps or turbans, costumes of Mughal Era.	**10 Hrs**	L1, L2, L3, L4
MODULE 5: What is communication theory, what is culture, aspects of culture, gender differentiation, social status, religion, types of culture. Language: Speech, writing, Para language-kinetics, tone and charter of voice, proxemics, clothing, body language, Non-verbal communication, Proxemics-Space as communication, Chronemics - Time as communication interpersonal communication and self-presentation.	**10 Hrs**	L2, L3,L4

COURSE OUTCOMES:
On completion of this course, Students will be able to
1. Learn the various importance of clothing like Protection, Modesty, Adornment Identification, Status, Individuality, and Personality.
2. Gain knowledge about the costume history of western and Indian civilization.
3. Will be able to understand the basics of communication through clothing.

Graduate Attributes (as per NBA)
➢ **Engineering Knowledge**
➢ **Problem Analysis**
➢ **Design/development of solutions (partly)**
➢ **Interpretation of data**

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

Text Books:
1. Arnold, Rebecca. Fashion, Desire and Anxiety: Image and Morality in the 40th Century.
2. New Brunswick: Rutgers University Press 4001.
3. Barnard, Malcom. Fashion as Communication. London: Routledge Press 4004
4. A Cultural Approach to Communication, Carey

References:

1. Barthes, Roland. The Language of Fashion. New York: Berg Publishers 4006.
2. Weisberger, Lauren. The Devil Wears Prada. New York: Anchor Books   4006.

GLOBAL TRADE PRACTICES
[As Per Choice Based Credit System (CBCS) Scheme]
SEMESTER - VIII

Subject Code	17TX834	IA Marks	40
Nu. of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	52	Exam Hours	03

CREDITS - 03

COURSE OBJECTIVES :
The objective of this course is to make students understand the basic concepts of global business practices followed in textile and garment industries. The course will enable the students to understand the international business scenario, business communication, international trade practices etc.

MODULES	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1: **INTRODUCTION:** Definition – trade and investment flow – economic theories – forms of international business – Trade procedures and documents – FOREX Policy – Export promotion – Export management – exchange rate determination – Exchange risk – Managing exchange rate.	**10 Hrs**	L1, L2
MODULE 2: **INTERNATIONAL BUSINESS ENVIRONMENT:** Globalization of business – economic, political and cultural environment of international business – WT O and trade liberalization – emerging issues – implications for India –regional trade blocks – inter – regional trade among regional groups.	**11 Hrs**	L1, L2
MODULE 3: **GLOBAL STRATEGIC MANAGEMENT:** Structural design of MNEs – strategic planning – strategic considerations – national Vs global competitiveness. **CONTROL AND EVALUATION OF INTERNATIONAL BUSINESS:** Control of MNEs – approaches to control – the role of information systems – performance measurement – mechanics of measurement – various performance indicators – evaluation and evaluation systems.	**10 Hrs**	L1, L2, L3
MODULE 4: **CONFLICT IN INTERNATIONAL BUSINESS & NEGOTIATIONS:** Factors causing conflict –conflict resolution actions – the role of negotiations in international business – the role of international agencies in conflict resolution. **COMMUNICATION IN BUSINESS:** Systems approach, forms of business communication, management and communication, factors facilitating communication.	**11 Hrs**	L1, L2, L3, L4

MODULE 5:	10 Hrs	L2, L3
COMMUNICATION PROCESS : Interpersonal perception, selective attention, feedback, variables, listening barriers to listening, persuasion, attending and conducting interviews, participating in discussions, Debates and conferences, presentation skills, paralinguistic features, oral fluency development. **BUSINESS CORRESPONDENCE**: Business letter. Memos, minutes, agendas, enquiries, orders, sales letters, notice, tenders, letters of application, letter of complaints.		

COURSE OUTCOMES:
1. This subject helps the student to acquire the concepts of international trade practices in textile and garment business activities.
2. This subject prepares the student to start individual enterprises and carryout international trade practices.
3. Students are exposed to global business scenario, business communication skills etc. so that they apply these concepts in the actual work environment for maximum benefits.

Graduate Attributes (as per NBA)
➢ Engineering Knowledge
➢ Problem Analysis
➢ Design/development of solutions (partly)
➢ Interpretation of data

Scheme of Examination / Question paper pattern
• Two full questions (with a maximum of four sub questions) of **TWENTY** marks each to be set from each module. Each question should cover all contents of the respective module.
• Students have to answer five full questions choosing one full question from each module

TEXT BOOKS:
1. John. D. Daniels and Lee H. Radebaugh, 'International Business', Pearson Education Asia, New Delhi, 4000.
2. Richard M. Hodgetts and Fred Luthans, International Management', Tata McGraw Hill, New Delhi, 4003.
3. Charles W.L. Hills, 'International Business', Tat a McGraw Hill, New Delhi, 4005.
4. Francis Cherunilam, International business, wheeler publication.

REFERENCES:
3. Anand K. Sundaram and I. Stewart Black, 'The International Business Environment', Prentice Hall of India, New Delhi, 4001.
4. Michael R. Czinkota, IIkka A. Ronkainen and Michael M. Moffett, 'International Business', Thompson, Asia, Bangalore, 4003.
5. Don Ball and Wendell McCulloch, 'International Business', Irwin McGraw Hill, New York, 1999.
6. Roger Bennett, 'International Business', Pitman publishing, New Delhi, 4000.
7. Vyuptakeshgaram, 'International business' , Pearson Education, New Delhi, 4006.