

- 1. COURSE TITLE : YARN MANUFACTURE -III**
2. COURSE CODE : TT-401
3. SEMESTER : FOURTH

4. Rationale : In the third semester, detailed study of the preparatory part of the spinning processes was covered. In Yarn Manufacturing-II carding & draw frames were discussed. In this fourth semester, Yarn Manufacturing III - is a continuation of the detailed study of spinning process. This subject covers further part of spinning process like comber lap preparation, combing, speed frame & ring frame. It covers the study of principles and description of these processes and functions of all machines and their parts with related information and skills.

5. Course Outcomes:

At the end of the course, students should be able to:

- CO-1 Paraphrase the process of comber lap preparation.
- CO-2 Illustrate the combing cycle.
- CO-3 Describe the working of drafting & twisting systems in speed & ring frame.
- CO-4 Explain the process of winding & building in speed & ring frame.
- CO-5 Calculate different process parameters like draft, twist, etc
- CO-6 Analyse the productivity and performance of comber, speed & ring frame.

5. Teaching Scheme (in hours)

Lecture	Tutorial	Practical	Total
45(Including 3hrs class test& 6hours tutorial	6	45	90

6. Examination Scheme

Theory				Practical			
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
70	30	100	33	50	50	100	33

7. Detailed Course Content:

Chapter No.	Chapter Title	Content	Duration (L+T)
1	Combing	1.1 Introduction – Preparation to combing and comber operation 1.2 Objects of Sliver lap, Ribbon Lap and Super Lap. 1.3 Study of construction and working of lap preparation machine-sliver lap, Ribbon lap and Super lap.	9+1hours

		<p>1.4 Influence of lap preparation on combing-evenness of lap sheet, deposition of the hooks.</p> <p>1.5 Causes of defective production and their remedies at above machines</p> <p>1.6 Calculation related to production & draft of Sliver lap & Ribbon Lap</p> <p>1.7 Types of Comber - Sequence of operation of rectilinear comber</p> <p>1.8 Technology of combing- parameters influencing the combing operation, influence of the combing on quality.</p> <p>1.9 Influence of machine component and setting on combing.- Feed distance moved per cycle, type of feed ,the detachment setting, number of points on the comb, the depth of penetration of top comb, piecing.</p> <p>1.10 The comb- cylinder comb, top comb, operations of comb</p> <p>1.11 Drafting arrangement, waste removal</p> <p>1.12 Study of important setting and its effects on working - step gauge, distance gauge, top comb settings.</p> <p>1.13 Specification of Modern Comber</p> <p>1.14 Causes and remedies of defective production at Comber</p> <p>1.15 Calculation of Hank, Draft, Production ,and Noil Percentage</p>	
2	Speed Frame	<p>2.1 The necessity of Speed frame.</p> <p>2.2 Description of functions of Speed frame – operating sequence, effect of arrangement of bobbins in two rows.</p> <p>2.3 Operating regions of the roving- creel, Spindle and flyer - Imparting twist, the spindle, the flyer, the flyer top, the presser arm.</p> <p>2.4 Winding of the bobbin. Flyer leading and bobbin leading its comparison</p> <p>2.5 Gearing diagram of Speed frame (Question not to be asked in theory Exam)</p> <p>2.6 Bobbin drive, cone drive transmission, lifter motion</p> <p>2.7 Study of building mechanism of Speed frame- shifting of cone belt, reversal of bobbin rail, shortening of lift.</p>	7+1hours

		2.8 Monitoring device- sliver stop motion, roving stop motion 2.9 Gear change position of the Speed frame. 2.10 Modern developments in Speed frames – creel, drafting and collecting zones 2.11 Calculation of Hank, Draft, Twist & Production. 2.12 Causes of defects and remedies.	
3	Ring Frame	3.1 Introduction 3.2 Function and mode of operation. 3.3 Design feature of machine- Frame, creel, drafting arrangement, 3.4 Spindle drive, yarn guiding device, balloon control ring, separators, types of rings, 3.5 Traveller-task and function, Types, wire profile of Traveller, Traveller clearer, Traveller numbering system 3.7 Variable drive 3.8 Structure of Ring bobbin, Winding process, Builder motion of ring bobbin, building the base. 3.9 Monitoring system, ring data system 3.10 Modern development in Ring frame 3.11 Calculation of draft, twist and production of Ring frame, 3.12 Average count and 20s conversion	26+1hours
		Total =	45hours including 3class tests

8. Distribution of Marks

Chapter No	Chapter				Total
		Objective type	Short Question	Descriptive	
1	Combing	6	3	10	19
2	Speed Frame	9	5	10	24
3	Ring Frame	10	7	10	27
		25	15	30	70

Table of Specification:

Sl No	TOPIC	OBJECTIVE TYPE				SHORT ANSWER TYPE				ESSAY TYPE					GT	
		K	C	A	T	K	C	A	HA	T	K	C	A	H A	T	
1	COMBING	3	3		6	2	1			3	5		5		10	19
2	SPEED FRAME	3	3	3	9	2	1	2		5		5	5		10	24
3	RING FRAME	3	2	5	10	2	1	1	3	7			5	5	10	27
	TOTAL	9	8	8	25	6	3	3	6	1 5	5	5	1 5	5	30	70

9. Learning Resources:

Book List:

Sl No.	Author	Title	Publishers
T1. T2.	T. K. Pattabhiram A. R. Garde (Editor)	Essential Facts in Cotton Spinning Spinning Tablet Series (9nos)	Somaiya Publication The Textile association, India.
T3.	A. E. De Barr, H.Catling	The Principles and Theory Of Ring Spinning. Vol. 5	The Textile Institute Manchester Melschwe
T4.	Ed. By K. Ganesh, A. R. Garde.	Cotton Spinning.	The Textile association, India
T5.	K. R. Salhotra, R. Alagirusamy, R. Chattopadhyay	Ring Spinning, Doubling and Twisting	NCUTE, IIT Delhi
R1.	R.Chattopadhyay, R. Rengasamy J	Spinning-Drawing, Combing and Roving.	NCUTE, IIT Delhi
R2.	R.Chattopadhyay	Advances in Technology of Yarn Production	NCUTE, IIT Delhi
R3	W.klein	Practical Guide to combing & Drawing	The Textile Institute Manchester
R4	W.S.Tagart	Cotton Spinning vol-2	Macmillian & Company ltd.
R5	A. R.Khare.	Cotton Spinning	The Textile Institute Manchester

1. **COURSE TITLE** : **YARN MANUFACTURE –III (PRACTICAL)**
2. **COURSE CODE** : **TT-401**
3. **SEMESTER** : **FOURTH**
4. **Examination Scheme**

Theory				Practical			
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
-	-	-	-	50	50	100	33

List of Practical's

1. Identify the different parts of the speed frame that are on the path of the material and draw the flow of fibres through the speed frame.
2. Identify the different parts of the drafting system, the gearing of different rollers and calculate the individual, total draft as well as the draft constant. Draw the gearing of drafting rollers. (S/F)
3. Identify the different parts of the twisting system, the gearing of different rollers and calculate the twist as well as the twist constant. Draw the gearing of the twisting system. (S/F)
4. Identify the different parts of the m/c involved in building the bobbin and draw a diagram. (S/F)
5. Draw a complete gearing diagram of the m/c indicating the different change places as well as the implication of these change places. (S/F)
6. Identify the different parts of the ring frame that are on the path of the material and draw the flow of fibres through the ring frame.
7. Identify the different parts of the drafting system, the gearing of different rollers and calculate the individual, total draft as well as the draft constant. Draw the gearing of drafting rollers. (R/F)
8. Identify the different parts of the twisting system, the gearing of different rollers and calculate the twist as well as the twist constant. Draw the gearing of the twisting system. (R/F)
9. Identify the different parts of the m/c involved in building the bobbin and draw a diagram. (R/F)
10. Draw a complete gearing diagram of the m/c indicating the different change places as well as the implication of these change places. (R/F)

1. **COURSE TITLE** : **FABRIC MANUFACTURE -III**
 2. **COURSE CODE** : **TT-402**
 3. **SEMESTER** : **4TH**

4. Rationale :

During Weaving I & Weaving II, the student studies the conventional machines. The conventional machines & equipments have limitations with respect to quality and production capacity. In the present era of globalisation in our country, the age of competition is being witnessed. There is a clear indication of shift from seller's market to consumer's dominated market. This will further have an impact to reduce the cost of production and distribution as well as to inculcate high standards of quality in the product. Now , it is becoming imperative to use advanced machines and equipments

These machines should be capable of giving very high fault free production and high quality product in weaving. In India , the trend of modernisation with state of art technology is introducing by scrapping old machines to capture international market. Many textile mills have already incorporated this advanced system. This system being highly capital intensive, it should be used to its highest potential. Therefore, students should be equipped with the knowledge and information about the construction, working, process control and maintenance of these advanced machines. Simultaneously the advanced machines adopt automation of functions and lot of electronic monitoring system to achieve the targets with respect to quality and production. In weaving shuttleless looms, ultramodern winding ,warping, and sizing machine automatic on-line fabric inspection ,auto-drawing machine are included in advanced machine. This subject involves classroom lectures as well as mill visits to impart knowledge and necessary skills.

5. Course Outcome : At the end of the course, students should be able to:

- Illustrate Unconventional Weaving Machine
- Describe weft insertion in Projectile loom
- Illustrate weft insertion by Ravier
- Describe weft insertion by air jet,
- Explain the weft insertion by other methods
- Explain Multiphase weaving machine and circular weaving machine

6. Teaching Scheme (in hours)

Lecture	Tutorial	Practical	Total
45(Including 3hrs class test & 6hours tutorial	5	50	100

7. Examination Scheme

Theory				Practical			
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
70	30	100	33	25	25	50	17

Chapter No.	Chapter Title	Content	Duration (L+T)
1	Weft insertion by Projectile	1.1 Introduction 1.2 Main features of projectile weaving m/c. 1.3 Advantages of Projectile Weaving m/c. 1.4 Transfer of weft End from the projectile feeder to projectile. 1.5 Projectile picking mechanism. 1.6 Beat up mechanism 1.7 Selvedge formation	9+1 hours
2	Weft insertion by Rapier	2.1 Function of rapier 2.2 Classification of Rapier Weaving m/c Difference between Gabler & Dewas system of insertion. 2.4 Rapier Driving	4+1 hours
3	Weft insertion by Air Jet	3.1 Working principle of Maxbo-Murata 3.2 Air-requirements – Air Compressor, Air Quality-Moisture, Oil, Dust 3.3 Main jet and its operation 3.4 Traverse Aids for maintaining Air Flew – Profile reed, Realy Jets, 3.5 Methods of Air Jet control 3.6 Timing diagram 3.7 Practical Problem- Short of buckle pick, loose pick, snarling, excess no. of relay nozzle, tip trouble	5+1 hours
4.	Weft insertion by other methods	4.1 Difference between Air jet & Water jet 4.2 Merits & Demerits of Water jet Weaving m/c Weft supply system 4.4 Multiphase weaving introduction 4.5 Problem of Multiphase Weaving Machine 4.6 Circular weaving	5+1 hours
5	Weaving of certain commercial fabrics	5.1 Denim 5.2 Tyre Cord Fabrics 5.3 Weaving of Tapes 5.4 Split Weaving 5.5 Tubular Cloth	7+1 hours
6.	Non- Woven Fabrics	Contents: 6.1 Manufacturing Processes: Concept, historical development,	

		<p>classification and applications of the non-woven.</p> <p>6.2 Manufacturing process of the non-woven, classification of processes. Study of dry methods of manufacturing: preparation of the web by mechanical means, carding, different configurations of cards, woollen cards. Study of aerodynamic method of web production and machinery used. Orientation of fibers in the web. Study of web laying methods, cross lying of the webs, web drawing frame.</p> <p>6.3 Study of bonding methods : Mechanical Bonding: Needling technique and its various configurations, needles, shape, size, factors, influencing needling, properties of needled fabrics, reinforced needled fabric, surface structuring techniques.</p> <p>6.4 Adhesive Bonding: Basic information of some adhesives, types of bonds formed, bonding. methods like padding. Vat, Nip squeezing process, bath application (various methods:</p> <p>6.5 Spray application, Application by screen rollers. Thermal Bonding method.</p> <p>6.6 Study of wet process of web formation and bonding methods Study of laminated composition fabrics.</p>	9+1hours
		Total =	45hours including 3class tests

8. Distribution of Marks

Chapter No.	Chapter Title	Type of question			Total Marks
		Objective Type (Compulsory)	Short Question	Descriptive Question	
I	Weft insertion by Projectile	10	2	7	17
II	Weft insertion by Rapier	3	2	5	10
III	Weft insertion by Air Jet	3	5	5	9
IV	Weft insertion by other methods	2	2	4	10

V	Weaving of certain commercial fabrics	4	4	2	12
VI	Non- Woven Fabrics	3		2	12
	TOTAL	25	20	25	70

9. Table of Specification

Sr. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	A	HA
1	Weft insertion by Projectile	10	24	3	3	3	8
2	Weft insertion by Rapier	5	12	2	3	5	-
3	Weft insertion by Air Jet	5	12	2	2	5	-
4	Weft insertion by other methods	5	12	2	3	5	-
5	Weaving of certain commercial fabrics	8	19	2	3	3	4
6	Non- Woven Fabrics	9	21	2	4	3	3
Total		42	100	13	18	24	15

10. Detailed table of specification for theory

Sl No	TOPIC	OBJECTIVE TYPE				SHORT ANSWER TYPE					ESSAY TYPE					G T
		K	C	A	T	K	C	A	H A	T	K	C	A	H A	T	
1	Weft insertion by Projectile	10	-	-	10	2	-	-	-	2	-	2	2	3	7	
2	Weft insertion by Rapier	3	-	-	3	2	-	-	-	2	-	2	-	3	5	
3	Weft insertion by Air Jet	3	-	-	3	2	2	1	-	5	-	2	-	3	5	
4	Weft insertion by other methods	2	-	-	2	1	1	-	-	2	-	2	-	2	4	
5	Weaving of certain commercial fabrics	4	-	-	4	1	1	2	-	4	-	-	-	2	2	
6	Non- Woven Fabrics	3	-	-	3	2	1	2	-	5	-	-		2	2	
		25	-	-	25	10	5	5	-	20	8	2		15	25	

9. Learning Resources:

Book List:

Sl No.	Author	Title	Publishers
1.	Luneschloss W.Albrecht	Non- Woven Bonded Fabrics-I	John Wilet & Sons
2.	Melschwe	Composite Material Handbook	Mc-Grow Hill Wellington
3.	SabitAdnaur	Handbook of Industrial Textile	Technomic Publishing Co- Inc
4.	NCUTE IIT	Shuttleless looms	NCUTE IIT, Delhi
5.	BaltrasubhashGoswami BhuvneshWadswotrth	Non- Woven Fabrics Handbook	Assotiation of the non- woven & carilina
6.	Jirsakoldrichwadsworthlory	Non- Woven Textiles	GarrohiAcademicPress, North Carolina
7.	Gulrajani M,L,	Non- Woven	The Textile Institute, New Delhi RIAF publish
8.	M.K.Talukder, P.K.Shriramulu D.B.Ajgaonkar	Weaving Machines, Mechanism Management	Mahajan Publishers Pvt. Ltd., Ahmedabad
9	R. Marks A.T.C. Robinsons	Principles of Weaving	Principles of Weaving(UK)

10 Magazine / Journals

1. Textile Research Journal,
2. Textile Trend
3. Textile Asia
4. Indian Textile Journal

1. **Course Title** : **Fabric Manufacture –III (Practical)**
2. **Course Code** : **TT-402**
3. **Semester** : **4th**
4. **Examination Scheme:**

Theory				Practical			
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
70	30	100	33	25	25	50	17

Practical List:

1. Comparative study of features of shuttle loom and shuttleless loom.
2. Study of projectile weaving machine: Impulsive torsion rod picking mechanism, matched
3. cam shedding mechanism, beat up mechanism & various types of projectiles used on
4. projectile loom.
5. Study of flexible Rapier weaving machine. Design of giver and taker rapier, study of rapier
6. drive, weft colour change mechanism, study of control panel on loom
7. Study of Airjet weaving machine study of main nozzle, relay nozzle, profile reed & suction
8. nozzle ,study of timings and air pressure for main and relay nozzles, study of compressor
9. used for air jet loom, study of control panel on air jet loom.
10. Study of weft accumulators used on shuttleless looms. Object, construction & working,
11. setting for pick length, yarn twist and speed.
12. Various let off & take up mechanisms used on shuttleless weaving machines.
13. Mill visit to shuttleless weaving unit.
14. Study of selvedge formations on different shuttleless looms.
15. Loom running practice; drawing - in, knotting on shuttle less weaving machine.

1.COURSE TITLE : TEXTILE WET PROCESSING-II

2.COURSE CODE : TT-403

3.SEMESTER : 4TH

4.Rationale of the course : This part of the Textile processing explains various fundamentals underlying the chemistry of textile Dyeing. Application of color to the textile materials, color concept which will develop basic understanding and skill of the students. This part also explain development of design by printing technology.

5. Course Outcome : After completion of the course student will be able to

- i) Explain the properties and characteristics of Vat dyes and Sulphur dyes, application on different fibers, use of chemicals with their functions and its after treatment and topping with basic dyes.
- ii) List out the different steps of application of disperse dyes on polyester, polyester blended goods by carrier, HTHP & thermosol method, the properties of disperse dyes, chemicals used with their functions.
- iii) Performed dyeing process of blended fabric.
- iv) Explain the correction of shades by stripping and dyeing, methods of correction, chemicals used & its functions.
- v) Explain the source, extraction and the application of vegetable dyes on cotton, and silk.
- vi) Explain the objects of printing, the preparation of the fabric before printing, the preparation of printing paste with different dyestuffs, thickening agents & assistants used with their functions, trade names with their manufacture.

6. Teaching scheme (in hours)

Lecture	Tutorial	Practical	Total
45 (including 3 class test)	5	45	95

7. Examination Scheme

Theory				Practical			
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
70	30	100	33	25	25	50	17

8.Detailed Course Content :

Chapter No	Chapter Title	Content	Hrs
Unit-I	PROPERTIES AND APPLICATION OF INSOLUBLE DYES AND SOLUBLE VAT DYES	i) Different Types of Vat dyes and their Classification. ii) Physical and Chemical Properties of Vat Dyes. iii) Application process of Vat dye on cotton/Viscose. iv) Physical and Chemical Properties of Sulpher Dyes. v) Application process of Sulpher dye on cotton/Viscose vi) Properties and Application of soluble Vat Dyes.	8
Unit-II	PROPERTIES AND APPLICATION OF DISPERSE DYES	i) Disperse Dyes and their Physical and Chemical Properties. ii) Application process of Disperse dye on Polyester.(Carrier Dyeing method) iii) Application process of Disperse dye on Polyester.(HTHP Dyeing)	5
UNIT-III	DYEING OF BLENDED FABRIC.	i) Dyeing on cotton/polyester blend by using disperse and Reactive Dye. ii) Dyeing of Acrylic/viscose blend by using basic and reactive dye.	8
UNIT-IV	CORRECTION OF SHADE AND PRAPARATION OF SHADE CARD.	i) Faulty shades produced by different dyestuff, precaution and their rectification. ii) Methods of strip of dyes from dyed materials of different classes of dyes from different textile fibres. iii) Shade correction of dyed materials by adding of dyes.	4
UNIT-V	VEGETABLE COLOR. (Natural Dye)	i) Different Sources Of natural Dye. ii) Extraction Process of Vegetable Color. iii) Application process of Natural dye on cotton and Silk. iv) Object and methods of after treatment of Natural Dyes.	5
UNIT-VI	TECHNOLOGY OF PRINTING	i) Aim and objective of Printing. ii) Assistant and Auxiliaries used in printing. iii) Preparation of printing paste.	15

		iv) Traditional Methods of printing. (Block and Screen printing.) v) Industrial Method of Printing. (Roller and Rotary Screen Printing Method) vi) Modern Printing Technology. (Computerized Digital printing method.)	
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9. Distribution of Marks :

Chapter No	Chapter Title	Type of Question			Total Marks
		Objective Type	Sort Questions	Descriptive Questions	
Unit I	Properties And Application Of Insoluble Dyes	1+1+1	3	11	17
Unit II	Properties And Application Of Disperse Dyes	1	2	7	10
Unit III	Dyeing Of Blended Fabric.	1	3	6	10
Unit IV	Correction Of Shade And Preparation Of Shade Card.	1+1	3		5
Unit V	Vegetable Color. (Natural Dye)	1+1+1		5	8
Unit VI	Technology Of Printing	1+1+1+1+1	4	11	20
		15	15	40	70

10. TABLE OF SPECIFICATIONS FOR THEORY

Sr. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	A	HA
1	Properties And Application Of Insoluble Dyes	8	19	2	10	5	
2	Properties And Application Of Disperse Dyes	5	12	1	7	2	
3	Dyeing Of Blended Fabric.	8	19	1	9		
4	Correction Of Shade And Preparation Of Shade Card.	4	10	1	4		
5	Vegetable Colour. (Natural Dye)	5	12	1	7		
6	Technology Of Printing	12	29	9	10		
Total		Σ b	100				

11. DETAILED TABLE OF SPECIFICATIONS FOR THEORY

Sr. No	Topic	OBJECTIVE TYPE				SHORT ANSWER TYPE					ESSAY TYPE				
		K	C	A	T	K	C	A	H A	T	K	C	A	HA	T
1	Properties And Application Of Insoluble Dyes	2	1		3		3			3		6	5		11
2	Properties And Application Of Disperse Dyes	1			1		2			2		5	2		7
3	Dyeing Of Blended Fabric.	1			1		3					6			6
4	Correction Of Shade And Praparation Of Shade Card.	1	1		2		3			3					0
5	Vegetable Color. (Natural Dye)	1	2		3							5			5
6	Technology Of Printing	2	3		5	2	2			4		6			11

K = Knowledge C = Comprehension A = Application
 HA = Higher Than Application T = Total

12. Intended Learning Outcome.(ILO)

S.L No	Course outcome	Intended Learning Outcome
1	Understand the properties and characteristics of Vat dyes and Sulphur dyes, application on different fibers, use of chemicals with their functions and its after treatment and topping with basic dyes.	Students will able to, List the characteristics and properties of sulphur dyes. Enlist the chemicals used & their functions. Understand oxidation Understand Sulphur black tendering and procedure to minimize such tendering effect. Identify the cause for bronziness of Sulphur dyed material. Understand the chemical constitution of Sulphur dye. Enlist the steps involved to get a Sulphur colour. Understand the process of after treatment of Sulphur dyed goods. Enlist the properties of vat dyes Understand the different steps to obtain a vat colour on

		<p>yarn/ fabric.</p> <p>Measure the dye bath concentration for different methods.</p> <p>Explain the conditions for different method of vat dyeing.</p> <p>Understand the chemical structure of insoluble and soluble condition of vat dyes.</p>
2	<p>List out the different steps of application of disperse dyes on polyester, polyester blended goods by carrier, HTHP & thermosol method, the properties of disperse dyes, chemicals used with their functions.</p>	<p>Enlist the properties of disperse dyes.</p> <p>Understand polyester and polyester blended goods.</p> <p>List out the method of application of disperse dyes using carrier and H.T.H.P method.</p> <p>Understand the need for reduction clear.</p> <p>List out the chemicals used with their functions.</p> <p>Explain the preventive measure taken during dyeing.</p> <p>Describe the method of application of disperse dyes on polyester and polyester blended fabric by thermosal method.</p> <p>List out the chemicals used in theromosal method with their functions.</p> <p>List out the method of dyeing polyester cotton blended fabric using HTHP and jigger dyeing machines</p>
3	<p>Performed dyeing process of blended fabric.</p>	<p>Performed dyeing process of cotton / polyester blend.</p> <p>Performed dyeing process of Viscose/ polyester blend.</p> <p>Performed dyeing process of Viscose/silk blend.</p>
4	<p>Understand the correction of shades by stripping and dyeing, methods of correction, chemicals used & its functions.</p>	<p>Identify the faulty shades produce by different dyestuffs (both soluble & insoluble).</p> <p>List out the precautions and rectifications required to overcome faculty shades.</p> <p>List out the techniques used to strip dyes from dyed material of different classes of dyes.</p> <p>List out the preventive measure to be taken while stripping dyes from dyed textile material..</p>
5	<p>Explain the source, extraction and the application of vegetable dyes on cotton, silk (Mulberry Silk, Eri Silk. Etc.)</p>	<p>Enlist different vegetable dyes</p> <p>Explain the source & extraction of vegetables dyes</p> <p>Describe the application of dyes on cotton, and silk.</p>
6	<p>Explain the objects of printing, the preparation of the fabric before printing, the preparation of printing paste with different dyestuffs,</p>	<p>Acquire the knowledge of printing on cotton, synthetic & blended fabrics using different dyes & pigments.</p> <p>Know about the processes involved to prepare fabric for printing.</p> <p>Understand the techniques involved in preparation of printing paste with different dyestuffs and pigment.</p>

	thickening agents & assistants used with their functions, trade names with their manufacture.	Know about the various types of thickeners and assistants used in printing paste, their essential qualities and functions along with their trade names. Enlist the different methods of printing. Access knowledge to creation of design by wooden block and the techniques involved in production of such designs using one or more colour Understand the process of making of a stencil for a particular design and the use of it. Describe the process involved in preparing a screen for a design, the materials & chemicals used and their function
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13. Suggested Implementation Strategies : The syllabus can be completed by regular classes, special classes using audio –visual aids, tutorial classes and providing writing materials. Practical classes in the laboratory helps students to understand the subject.

14. Suggested learning Resource :

- i) Technology of Dyeing by V A Shenai.
- ii) Technology of Printing by V A Shenai.
- iii) A Glimpse on the chemical technology of Textile Fibre by R R Chakraverty.
- iv) Dyeing and Chemical Technology of textile fibre by E R Trotman.
- v) Chemistry of dyes and principle of dyeing by V A Shenai.
- vi) Technology of Bleaching by V A shenai.
- vii) Textile Finishing by Nalankilti.
- viii) Chemical processing of cotton polyester blend by ATA.

1.COURSE TITLE : TEXTILE WET PROCESSING-II(PRACTICAL)

2.COURSE CODE : TT-403(P)

3.SEMESTER : 4TH SEMESTER

4 Objectives : At the end of the program the student will be able to Dye the Synthetic textile materials and also printing of fabric.

5. Teaching and Examination Scheme :

Lecture	Tutorial	Practical	Total
-	-	45	45

6.Detailed Course Content :

Instructions		Examination		
Hours/week	Hours/Semester	Internal assessment	Practical examination	Total
2	45	25	25	50

7. Examination Scheme

Theory				Practical			
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
-	-	-	-	25	25	50	17

7. Detailed Course Content :

Chapter No	Chapter Title	Name of the Topic	Hrs
Unit-I	Application Of Insoluble Dyes And Soluble Vat Dyes.	i)Application of Sulpher Dye on Cotton and Viscose. ii)Application of Vat dyes on Cotton and Viscose. iii) Application of Soluble Vat dyes on Silk.	12
Unit-II	Application Of Disperse Dyes.	i)Application of Disperse dye on polyester yarn/fabric by carrier dyeing method. ii) Application of Disperse dye on polyester yarn/fabric by HTHP dyeing method.	6
Unit-III.	Dyeing Of Blended Fabric.	i)Dyeing of polyester-viscose blend by using Disperse and Vat dye. ii) Dyeing of Acrylic-viscose blend by using Basic and Reactive dye.	6

UNIT-IV	Correction Of Shade And Preparation Of Shade Card.	i)Stripping of color from dyed yarn/fabric. ii)Preparation of stock dye solution in different percentage strength.	5
UNIT-V	Vegetable Color. (Natural Dye)	i)Extraction and application of natural dye on cotton and silk.(At least two natural dye)	6
UNIT-VI	Technology Of Printing	i)Preparation of printing paste and printing of cotton by block printing method. ii)Preparation of screen and printing of cotton by screen printing method. iii)Printing of cotton and silk by Resist Style.	10

8. Distribution of Marks :

Chapter No	Chapter Title	Type Of Question			Total Marks
		Objective Type	Short Questions	Descriptive Questions	
Unit I	Application Of Insoluble Dyes And Soluble Vat Dyes.				8
Unit II	Application Of Disperse Dyes.				7
Unit III	Dyeing Of Blended Fabric.				5
Unit IV	Viva				5
Total					25

1. Course Title :- **Fabric Structure & Analysis-II**

2. Course Code :- **TT-404**

3. Semester :- **4th**

4. Rationale of the subject/ Courses:- In this subject the compound weaves such as pile, back cloth, Double cloth, Gauge & leno weaving and Jacquard designing are covered. Yarn Calculation regarding the influence the yarn diameter cover factor and weigh of warp and weft are covered.

5. Teaching Scheme (in hours):-

Lecture	Tutorial	Practical	Total
45(Including 3hrs class test)	5	45	90

6. Examination Scheme:

Theory				Practical			
Examination		Sessional		Practical Viva		Sessional	
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
70	30	100	33	-	-	-	-

7. Detailed Course Content :

Chapter No	Chapter Title	Content	Duration (in hours)
1	Warp Pile Fabric	1.1. Construction of different terry pile fabrics such as 3pick, 4pick, 5pick & 6pick terry pile 1.2. Weaving mechanism for producing terry pile structure	4
2	Weft Pile Fabric	2.1. Plain back velveteen 2.2. Twill back velveteen 2.3. Corduroys 2.4. Length of pile 2.5. Density of pile 2.6. Fast pile structure	5
3	Back Cloth Design	3.1. Principle of tying & stitching back cloth 3.2. Different types of back cloth like Warp back, Weft back, Reverse back cloth, Warp waded weft back cloth, Weft waded warp back cloth	5
		4.1. Self stitched double cloth 4.2. Centre stitched double cloth	10

4	Double Cloth Design	4.3. Thread interchange double cloth 4.4. Cloth interchange double cloth 4.5. One side binding double cloth 4.6. Both side binding double cloth 4.7. Treble Cloth	
5	Gauze & Leno Weaving	5.1. Introduction of gauze & leno structure 5.2. Construction of doup healds & its uses 5.3. Gauze & Leno design, drafting plan, lifting plan & types of sheds	5
6	Yarn & Cloth Calculation	6.1. Influence of yarn diameter on cloth setting rules 6.2. Determination of cover factor & cloth particulars 6.3. . Calculation of Weight of Warp & Weft	8
7	Jacquard Design	7.1. Construction Bisymmetrical & multi Symmetrical figure 7.2. Different stages for transferring a small motif to the fabric 7.3. Arrangement of figure in jacquard design like unit repeat, Drop principle, Satin	5

8. Distribution of Marks :

Chapter No	Chapter Title	Type of Question			Total Marks
		Objective Type (Compulsory)	Short Questions	Descriptive Questions	
1	Warp Pile Fabric	1	2	7	10
2	Weft Pile Fabric	2	2	7	11
3	Back Cloth Design	1	2	7	10
4	Double Cloth Design	2	3	6	11
5	Gauze & Leno Weaving	1	2	6	09
6	Yarn & Cloth Calculation	2	2	6	10
7	Jacquard Design	1	2	6	09
		10	15	45	70

9. Suggested implementation Strategies :

10 Suggested learning Resource :

Books list

Sl. No.	Title	Author
1	Watsons Textile Design & Colour	Watson
2	Watsons Advanced Textile Design	Watson
3	Grammar of Textile Design	H. Nisbet

List of Journals :

1. Textile Research Journal,
2. Journal of Textile Institute, Manchester
3. Textile Trend
4. Textile Asia
5. Indian Textile Journal

1. **COURSE TITLE** : **TEXTILE TESTING -I**
2. **COURSE CODE** : **TT-405**
3. **SEMESTER** : **4TH**
4. **Rationale** : Different fibers are used in textile manufacturing, such as Cotton, Silk, Synthetic etc. These raw materials are used individually or mixed in different proportions to form a yarn of desired quality. The raw materials are to be tested for numerous characteristics like fiber length, fineness, strength, maturity etc. Intermediate products like sliver, roving etc. are also required to be tested for controlling the process, for optimizing the process parameters or for developing existing process. To ensure the quality of final product like yarn, fabric or garment, testing is imperative. This subject will equip students with the concepts, principles and methods of testing of various textile fiber and yarns, which is helpful in selection of raw materials, process control, process optimization and quality assurance. Since textile is a continuous process, variations in product quality are likely to occur. Results obtained from number of observations are to be analyzed, interpreted and used for best outcomes. Therefore, students are equipped with the methods to analyze the testing results statistically

Course Outcomes:

At the end of the course, students should be able to:

- CO-1 Describe about the importance of moisture in textiles.
- CO-2 Discuss the different moisture parameter measuring methods.
- CO-3 Explain the significance of fibre length, fineness, maturity, strength, and trash.
- CO-4 Illustrates the terminologies used in expressing fibre length, fineness, maturity, and strength.
- CO-5 Describe the different measuring methods of fibre length and trash.
- CO-6 Summarize the different measuring methods of fibre fineness, maturity, and strength.

5. Teaching Scheme(In hours)

Lecture	Tutorial	Practical	Total
45 (including 3 hrs class test)	5	45	95

6. Examination Scheme

Theory				Practical			
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
70	30	100	33	25	25	50	17

7. Details Content:

Chapter No.	Chapter Title	Content	Duration (In hours)
I	Moisture And Textiles	<p>1.1 Effect of Moisture on Textiles and textile processing and Testing.</p> <p>1.2 Definition of absolute & relative humidity, moisture content & moisture regain & their relationship.</p> <p>1.3 Study of the methods for the determination of the followings: a). Relative humidity by wet & dry bulb hygrometer. b) Moisture content & moisture regain by Conditioning oven & Shirley moisture meter.</p>	10
II	Fibre Length	<p>2.1 Concept, significance & importance of fibre length in processing & in quality yarn. Study of the working principle and method of operation of the following instruments for fibre length measurement.</p> <p>Bear sorter Sledger stapler User stapler fibrograph</p> <p>2.3 Comparative study of the above instruments</p> <p>2.4 Hand stapling of cotton its use and limitation.</p>	8
III	Fibre Fineness & Maturity	<p>3.1 Importance of fibre fineness & maturity in processing & quality of yarn. Related terms for indicating fibre fineness & maturity.</p> <p>3.2 Study of the following methods for determining fibre fineness & maturity.</p> <p>a) Air flow and gravimetric methods. b) Differential dyeing methods & swelling methods. c) Maturity count determination</p>	10
IV	Fibre Strength	<p>4.1 Importance</p> <p>Definition of the following terms stress, Mass stress strain, young's modulus, tenacity breaking length, elasticity, elastic limits, elastic recovery, work of rupture, work factor and creep.</p> <p>Brief study of stress – strain curve for Cotton Viscose Nylon Terylene</p> <p>4.4 Study of the methods for measuring fibre strength</p>	10

		in both single & bundle form by pressly tester and stelometer	
V	Trash Content In Cotton	5.1Determination of trash content in cotton. 5.2Study of the principle of working of Shirley analyzer	4
Total			42+3

8. (a) Distribution of marks:

Chapter No.	Chapter Title	Type of Question			Total Marks
		Objective Type (Compulsoty)	Short Question	Descriptive Question	
I	Moisture And Textiles	5	4	5	14
II	Fibre Length	6	6	5	17
III	Fibre Fineness & Maturity	6	6	5	17
IV	Fibre Strength	6	5	5	16
V	Trash Content In Cotton	2	0	4	6
Total		25	21	24	70

(b) Table of Specifications

Sr. No	Topic	OBJECTIVE TYPE				SHORT ANSWER TYPE					ESSAY TYPE					GT
		K	C	A	T	K	C	A	HA	T	K	C	A	HA	T	
1	Moisture in Textiles	3	1	1	5	2	2	0	0	4	0	5	0	0	5	14
2	Fibre Length	2	2	2	6	2	0	2	2	6	0	5	0	0	5	17
3	Fibre Fineness	3	1	2	6	2	0	2	2	6	5	0	0	0	5	17
4	Fibre Strength	3	2	1	6	3	2	0	0	5	0	0	5	0	5	16
5	Trash Content	1	1	0	2	0	0	0	0	0	4	0	0	0	4	6
Total=		12	7	6	25	9	4	4	4	21	9	10	5	0	24	70

Sr. No	Topic	Time allotted in hours	Percentage Weightage	K	C	A	HA	Total
1	Moisture in Textiles	9	21	5	8	1	0	14
2	Fibre Length	10	24	4	7	4	2	17
3	Fibre Fineness	10	24	10	1	4	2	17
4	Fibre Strength	9	22	6	4	6	0	16

5	Trash Content	4	9	5	1	0	0	6
	Total =	42	100	30	21	15	4	70

9. Learning Resources:

Book List:

Sr. No	Author	Title	Publisher
1.	Angappan	Textile Testing-I & II	Textile Testing, Coimbatore
2.	J. E. Booth	Principles of Textile Testing	--
3.	Kothari	Testing and Quality Management	IAFL, New Delhi
4.	B. P. Saville	Physical Testing of Textiles	--
5.	--	Methods of Tests, Fibre, Yarn & Fabric	CIRCOT, Mumbai

10. List of Journals :
1. Textile Research Journal,
 2. Textile Trend
 3. Textile Asia
 4. Indian Textile Journal

11. COURSE PLAN

S. No	Course outcome	Intended Learning Outcome
1	Describe about the importance of moisture in textiles.	ILO-01 Define the different terms related to moistures, such as Humidity, Absolute Humidity, Relative Humidity, Moisture Content and Moisture Regain. ILO-02 State the effect of moistures on textiles. ILO-03 State the effect of moistures on textile processing. ILO-04 Deduce the relationship between moisture content (MC) and moisture regain (MR).
2	Discuss the different moisture parameter measuring methods.	ILO-01 List the name of different instruments used for measuring relative humidity (RH). ILO-02 Describe the working of RH measuring equipment. ILO-03 Classify the equipment used in determination of MC and MR. ILO-04 Demonstrate the working of MC measuring instrument. ILO-05 Demonstrate the working of MR measuring instrument.
3	Explain the significance of fibre length, fineness, maturity, strength and trash.	ILO-01 Explain the importance of fibre length in processing of yarn. ILO-02 Describe the significance of fibre fineness in processing and quality of yarn. ILO-03 Illustrate the significance of fibre maturity in processing

		<p>and quality of yarn.</p> <p>ILO-04 Explain the importance of fibre strength in processing of yarn.</p> <p>ILO-05 Define the significance of trash in cotton fibre quality.</p>
4	<p>Illustrates the terminologies used in expressing fibre length, fineness, maturity and strength.</p>	<p>ILO-01 Define Staple length, Span Length, Fineness, Tensile Strength.</p> <p>ILO-02 Define the following terms: Mass Stress, Strain, Young's Modulus, Tenacity, Breaking Length, Elasticity, Elastic Recovery, Work of Rupture and Creep.</p> <p>ILO-03 Draw and explain the stress-strain curve of cotton, Viscose, Nylon and Terylene fibre.</p> <p>ILO-04 Define the terminologies used in determination of maturity count.</p>
5	<p>Describe the different measuring methods of fibre length and trash.</p>	<p>ILO-01 List the name of different fibre length measuring instrument.</p> <p>ILO-02 Describe the principle and working of Baer Sorter instrument.</p> <p>ILO-03 Analyse the baer sorter diagram for finding out different fibre length parameters.</p> <p>ILO-04 Explain the working of Sledge Stapler.</p> <p>ILO-05 Illustrate the Uster Stapler with line diagram.</p> <p>ILO-06 Describe the principle and working of Fibrograph.</p> <p>ILO-07 Compare the various fibre lengths measuring instrument.</p> <p>ILO-08 Describe the hand stapling technique of fibre length determination.</p> <p>ILO-09 Demonstrate the use and limitations of hand stapling method.</p> <p>ILO-10 Describe the principle and working of Shirley Trash Analyser.</p>
6	<p>Summarize the different measuring methods of fibre fineness, maturity and strength.</p>	<p>ILO-01 Name the different fibre fineness measuring methods.</p> <p>ILO-02 List the different fibre maturity measuring techniques.</p> <p>ILO-03 Demonstrate the fibre fineness method by gravimetric method.</p> <p>ILO-04 Explain the Air flow principle used in fibre fineness measuring instrument.</p> <p>ILO-05 Describe the working of Sheffield Micronair instrument.</p> <p>ILO-06 Describe the working of ATIRA fibre fineness tester.</p> <p>ILO-07 Demonstrate the caustic soda swelling method.</p> <p>ILO-08 Explain the procedure for finding out maturity of fibre by differential dyeing method.</p> <p>ILO-09 List the different instruments used for finding out fibre strength.</p>

		<p>ILO-10 Describe the working of single fibre tester.</p> <p>ILO-11 Explain the working of Presley bundle fibre strength tester.</p> <p>ILO-12 Explain the working of Stelometer.</p> <p>ILO-13 Devise the merit and demerits of single and bundle fibre strength tester.</p>
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1. **COURSE TITLE** : **TEXTILE TESTING –I (PRACTICAL)**
 2. **COURSE CODE** : **TT-405(P)**
 3. **SEMESTER** : **4TH**

Theory				Practical			
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
-	-	-	-	25	25	50	17

- 1.0 **Identification of Textile fibres**
- By Burning test
 - By using simple/compound microscope
 - By chemical investigation
- 2.0 **Measurement of fibre length**
- By Hand Stapling Method
 - By using baer sorter
 - By using sledge sorter
- 3.0 **Determination of fibre fineness.**
- By Micronaire fineness tester
 - By ATIRA fineness tester.
- 4.0 **Measurement of fibre maturity**
- By differential dyeing methods
 - By swelling methods
- 5.0 **Determination of fibre strength (Single and Bundle fibre)**
- By stelometer, Eelectronic tensile tester.
 - Conversion of load-elongation curve to stress-strain curve and to find out different parameters.
- 6.0 Trash content analysis by using shirley analyzer

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1. **Course Title** :- Elements of Mechanical & Electrical Engineering
2. **Course Code** :- TT-406
3. **Semester** :- 4th semester
4. **Rationale of the subject/ Courses** :-
5. **Teaching Scheme (in hours)** :-

Lecture	Tutorial	Practical	Total
45 (3 class test & Tutorial)	-	-	45

6. Examination Scheme :

Theory				Practical			
Examination		Sessional		Practical Viva		Sessional	
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
70	30	100	33	-	--	-	-

7. Detailed Course Content :

Chapter No	Chapter Title	Content	Duration (in hours)
1	Elements of Electrical Engineering	1.0. Direct Current Circuits: 1.1 Kirchoff's Law- point law & mesh law problem 1.2 Wheatstone bridge – principle & its application in meter bridge with problems (Balance Bridge)	
2	A.C. Fundamentals	1.0. Definition -cycle time period, frequency, amplitude. Generation of A.C. voltage value and current and their wave forms. 1.1 Phase, phase difference, R.M.S. & average value with definition and mathematical equation, Form factor & crest factor. 1.2 Vector representation of alternating quantities (graphical), active & reactive power, power factor.	
3	A.C. current with Resistance, Capacitance and Inductance (only in	1.1 A.C. circuit with pure resistance, pure inductance, pure capacitance, power factor. 1.2 Series circuit including simple	

	series circuit)	problems (wing phase diagram). Computation of power & power factor in simple R-L, R-C, R-L-C series circuit only (using phase diagram)	
4	Three phase circuits	1.3 Phase and line quantities(voltage & current) Star & Delta Connection. Three phase power.	
5	D.C. Machine(D.C. motor only)	1.4 D.C. motor & working principle, construction, type of motor & their uses in different fields.	
6	A.C. machines (transformers 7 motors only)	1.5 Transformer construction & its working principle, transformation ratio, types, uses. 1.6 Induction motors: principle of three phase induction motors & their uses, different methods of starting with connection diagrams.	
7	Maintaining & Safety	1.7 Maintenance & safety of electrical installation in textile industries. 1.8 Treatment of electrical shock & other first aid measures.	
8	Elements of Mechanical Engineering	Generation of Steam 1.0. Boilers, classification of boilers, principal types, Cochran, Lancashire & water tube boilers. 1.1. Boiler Mounting & accessories – pressure gauge, water level indicator, safety valve, stop valve, feed check, valve blow –off cock, fusible plug, manhole, feed pump, injector, feed water heater, air pre heater steam separator, steam trap. Draught, natural & artificial draught (descriptive treatment only)	
9	Internal Combustion Engine	1.0. Classification of IC, engines, four stroke & two stroke cycles, principle of working diesel & petrol engine, name of main parts & their function. 1.1.Carburetion, ignition, injections, governing.	
10	Compressor	1.0. Reciprocating air compressor, use of compressed air, indicator diagram of a single stage compressor. 1.1. Rotary compressor. Descriptive	

		treatment of fans, rotary displacement blowers & turbo blowers.	
11	Air Conditioning	<p>1.0.Purpose factor in air conditioning, terms of air conditioning e.g.- water vapour, saturated & super heated water vapour, partial pressure humidity, relative humidity, dry bulb temperature, wet bulb temperature, dew point temperature, effective temperature. Psychometric & psychometric chart.</p> <p>1.1.Processes in air conditioning, air purification, control of temperature(heating of cooling), control of humidity.</p> <p>1.2.Layout & equipment of a modern air conditioning plant(the treatment should be based on textile industry & processes)</p> <p>1.3.MAINTANANCE OF MECHANICAL INSTALLATIONS AND FIRE PREVENTIONS (simply introduction)</p>	

8. Distribution of Marks :

Chapter No	Chapter Title	Type of Question			Total Marks
		Objective Type (Compulsory)	Short Questions	Descriptive Questions	
		25	15	30	70

9. Suggested implementation Strategies : Suggested Implementation Strategies : The syllabus has to be completed by regular classes with faculty interaction continuously with the students and system of continuous evaluation through assignments and class tests and demonstration through some dummy models.

10. Suggested learning Resource :

- 11 . Books list
- 12.List of Journals
- 13.Manuals
- 14.Others

1. **COURSE TITLE** : **PROFESSIONAL PRACTICE II**
 2. **COURSE CODE** : **TT-407**
 3. **SEMESTER** : **4TH**
 4. Examination Scheme :

Theory				Practical			
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Practical	Practical Assessment	Total Marks	Pass Marks
-	-	-	-	25	25	50	17

Rational :

To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.

Aim

Student will be able to:

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

1. INDUSTRIAL VISITS

6

Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work.

Two industrial visits may be arranged in the following areas / industries:

- i. Visit to a statistical quality control laboratories of reputed composite Textile Industries.
- ii. Fabric manufacturing units for study of new technology adopted.
- iii. Visit to textile processing units.

2. Lectures by Professional / Industrial Expert be organized from ANY THREE of the following areas:

6

- i. Study of material handling system in composite textile mill.
- ii. Study of effluent treatment plant of a processing unit.
- iii. Effluent/ Waste water treatment plant.

3. INDIVIDUAL ASSIGNMENTS:

6

Any two from the list suggested

- a) Tree plantation.
- b) Conduct of knowledge, skill and attitude test.
- c) Proper use of fire fighting equipments which are necessary for textile Industries.
- d) Awareness campaign for unemployment, cleanliness & nutrition.

4. MODULAR COURSES (OPTIONAL):

6

A course module should be designed in the following areas for max. 12 hrs. Batch size - min. 15 students.

Course may be organized internally or with the help of external organizations.

- a) Entrepreneurship development
- b) Inter personal relation-ship in the Industries.
- c) Computer aided textile-design
- d) Finishing school.

5. COSTING CALCULATION OF THE FOLLOWING FABRICS

6

- a) Gamucha, Mekhela chadar
- b) Furnishing Fabric- Window / Door Curtain, Bed Cover / Bed Sheet etc.
