

**COURSE CURRICULUM**  
**OF**  
**ADVANCED MODULES**  
**IN SECTOR**

**“TEXTILE PROCESSING AND TECHNOLOGY”**

**(To be implemented in ITIs offering Multiskill courses under Craftsmen Training Scheme or ITIs Upgraded as Centre of Excellence )**

**Directorate General of Employment & Training (DGE&T)**  
**M/o Labour & Employment**  
**Up-gradation of ITIs into Centres of Excellence**

## **Broad Guidelines for Implementation of Advanced Module in Sector**

### **“ TEXTILE PROCESSING AND TECHNOLOGY ”**

These Centres will be providing multi-skill training to meet skill requirement of TEXTILE INDUSTRY with their active involvement in all aspects of training. The training will be provided in three parts as given below.

- Broad Based Basic Training (of Six Modules) in Basic skill areas for a period of one year.
- Training in Advanced Modules for the First Six Months duration of II<sup>nd</sup> year after Broad Based Basic Training (BBBT)
- Testing & Certification both for the Broad Based Basic Training (BBBT) & Advanced Modules Training during subsequent Six Months will be conducted under the aegis of NCVT.
- Training in specialized modules (for the Second Six Months duration of II<sup>nd</sup> year) mainly by the industry. ( The course curricula ,duration etc are designed in consultation with the IMC ). The trade testing & certification for specialized modules will be done jointly by the State Government & Industry. Said Certificate will have reorganization from NCVT.
- As per the recommendations of the EFC , Training in the shop floor should constitute at least 25-40% of the curriculum.

The training programme will have multi-entry and multi-exit provision as given below :

- Trainee can opt to go to the labour market after completing broad based basic training of one year duration or after completing advanced modules.
- Multi-entry and multi-exit provision would enable a trainee to take admission for advanced / additional advanced / specialized module as per his/ her need.

### **Guidelines for training in Advanced Modules**

- A minimum of three modules would be essentially needed , so as to ensure that all the 96 trainees are accommodated in the three Modules , may be selected in consultation with IMC for which in two shifts.
- If it is felt that available modules for which the course curricula has been developed at National Level are not sufficient to cater to the needs of Local Industry in a particular State , States are free to select Module as per need in consultation with Industry. They may develop suitable Module (s) accordingly.
- A trainee at a time can opt only for One Advanced Module.

- **Admission Criteria , Space requirement , Qualification of Instructor of the various Advanced Modules of “ TEXTILE PROCESSING & TECHNOLOGY ” Sector are given below :**

Module No.	Name of the Modules	Admission Criteria	Space Requirement	Duration in weeks	Qualification of Instructor
ATPT-04	Advanced Textile Technology	Completed BBT in Textile Processing and Technology or or NTC /NAC in related trade or Diploma in Textile Technology	1. 80 Sq.mtr. for Each Advanced Module & height of workshop should be min. 5 mtr.	26 Weeks for Each Advanced Module	Degree in Textile Technology with minimum two years teaching / industrial experience in the relevant field. <b>OR</b> Diploma in Textile Processing & Technology with minimum five years teaching / industrial experience in the relevant field.
ATPT-05	Technology of Sizing , Bleaching and Finishing	Completed BBT in Textile Processing and Technology or or NTC /NAC in related trade or Diploma in Textile Technology	2. 20 Sq. mtr. For Dark Room Studio		
ATPT-06	Technology of Dyeing	Completed BBT in Textile Processing and Technology or or NTC /NAC in related trade or Diploma in Textile Technology			
ATPT-07	Technology of Printing	Completed BBT in Textile Processing and			

		Technology or or NTC /NAC in related trade or Diploma in Textile Technology			
ATPT-08	Computer Aided Textile , Design & Colour	Completed BBT in Textile Processing and Technology or or NTC /NAC in related trade or Diploma in Textile Technology			
ATPT-09	Testing of Chemicals and Textiles	Completed BBT in Textile Processing and Technology or or NTC /NAC in related trade or Diploma in Textile Technology			

**FEE STRUCTURE** : Fee Structure may be decided by States Govt. in consultation with IMCs . It may be desirable to prescribe a uniform tuition fee for a sector in all Centres of Excellence of a state.

## **EMPLOYMENT OPPORTUNITIES IN TEXTILE PROCESSING & TECHNOLOGY SECTOR**

### **JOB OPPORTUNITIES :**

- a) Supervisor/ Incharge in Spinning , Weaving , Bleaching, Dyeing, Printing, Finishing departments in Textile Mills.
- b) Technical Assisting in Laboratory/Research and Development sections of textile chemical processing units.
- c) Technician / Technical Assistant in textile committees, textile corporations, small scale industry organisation, and handloom industry.
- d) Technical Representatives manufacturers for Dyestuffs/textile auxiliaries.
- e) An entrepreneur of a textile processing unit/ dyestuffs industry.

## **COMPETENCY PROFILE IN TEXTILE PROCESSING & TECHNOLOGY SECTOR**

A Technician in textile processing & technology should have following competencies:-

1. Knowledge and skills pertaining to fibre, yarn, dyes and chemicals: their characteristics, preparation, specifications and usage.
2. Knowledge and skills of various processing machines required for processing of textiles in bleaching; dyeing, printing and finishing sections and upkeep of machinery.
3. Competencies in textile designs and Knowledge of types, combinations, application and evaluation of colours.
4. Competency to undertake testing of fibre and yarn and fabrics and dyes understanding various quality control operation and ability to inspect finished goods.'
5. Competency to prepare material, equipment and manpower schedule for processing of textile in various sections
6. Awareness of environmental pollution due to textile processing, procedure to control position and waste disposals and pollution

Act.

7. Ability to tackle simple shop floor related problems in the field of textile processing.
8. Basic skills in reading drawing

## **RECOMMENDATIONS FOR EFFECTIVE IMPLEMENTATION OF CURRICULUM**

The following recommendations are made for effective implementation of this curriculum. :

- a) While imparting instructions, stress should be laid on the development of practical skills in the trainees. For this purpose, as far as possible, classes should be conducted in the laboratories itself.
- b) Industrial visits should be organized as and when required to clarify the concepts, principles and practices involved. For this purpose, time has already been provided in trainees centered activities
- c) Extension lectures from professionals should be organized to impart instructions in specialized areas
- d) There is no need of purchasing very costly equipment. Efforts may be made to establish linkages with local industrial organizations
- e) Considerable stress should be laid on repair and maintenance of equipment
- f) Instructors should generate competitiveness among the trainees for the development of professional skills.
- g) ) Instructors should take working drawings from the industries and provide practices in reading these drawings
- h) Hobby clubs and other co-curricular activities be promoted to develop creativity in trainees.
- i) ) Instructors should be sent for training in the new areas incorporated in their curriculum.

Sr. No.	Name of Member	Designation For Trade Committee	Information about the Member
01	Mr. PRADIP P. ANDHARE Ph. No. 07232-304500 Cell - 9922945545	CHAIRMAN	D.G.M. ( HR & Admn.) RAYMOND UCO LTD ( DENIM DIVISION ) PLOT No. C-1 , M.I.D.C. , LOHARA , YAVATMAL
02	Mr. RAJU RANA Ph. No. 07232-320750 Cell - 9822695541 Fax No. 07232-349184	TECHNICAL MEMBER	CHAIRMAN , RANA DENIM PVT. LTD , PLOT No. 232 , NAGPUR ROAD , BHARI , YAVATMAL
03	Mr. NARENDRA P. YETE Ph. No. 0721-2660588 Cell - 9890440889	TECHNICAL MEMBER	INSPECTOR , VOCATION EDUCATION AND TRAINING , R.O. AMARAVATI
04	Mr. SANJAY V. TAYWADE Ph. No. 07235-227572 Cell - 9423405267	CO-ORDINATOR	PRINCIPAL , INDUSTRIAL TRAINING INSTITUTE , PANDHARKAWADA , DIST. YAVATMAL

# I N D E X

## **UP-GRADATION OF ITIs INTO CENTRES OF EXCELLANCE ( CoE)**

### **SECTOR : TEXTILE PROCESSING AND TECHNOLOGY**

### **ADVANCED MODULES IN II YEAR**

**( FOR THE FIRST SIX MONTHS OF II YEAR )**

<b>MODULE No.</b>	<b>NAME OF THE MODULES</b>	<b>DURATION IN WEEKS</b>
<b>ATPT-04</b>	<b>Advanced Textile Technology</b>	<b>26 Weeks</b>
<b>ATPT-05</b>	<b>Technology of Sizing , Bleaching and Finishing</b>	<b>26 Weeks</b>
<b>ATPT-06</b>	<b>Technology of Dyeing</b>	<b>26 Weeks</b>
<b>ATPT-07</b>	<b>Technology of Printing</b>	<b>26 Weeks</b>
<b>ATPT-08</b>	<b>Computer Aided Textile , Design &amp; Colour</b>	<b>26 Weeks</b>
<b>ATPT-09</b>	<b>Testing of Chemicals and Textiles</b>	<b>26 Weeks</b>

**Note : 1) The trainees those who will passed BBBT will be eligible for above Second Year Advanced Module.**

**2) Trainee has to select ANY ONE ONLY out of above Six Advanced Modules**

## Module – ATPT-04 : ADVANCED TEXTILE TECHNOLOGY

### I) COURSE CONTENT :

PRACTICAL	THEORY
<p><b>Skills to be developed :</b>  <b>Intellectual skills:</b></p> <ol style="list-style-type: none"> <li>1) Objects of process in spinning.</li> <li>2) Form of material in each process.</li> <li>3) Working of machines in spinning department.</li> <li>4) Objects of weaving &amp; its preparatory process.</li> <li>5) Process flow for striped &amp; check fabrics.</li> <li>6) Working of winding, warping, sizing &amp; weaving machine</li> </ol> <p><b>Motor skill:</b></p> <ol style="list-style-type: none"> <li>1) Draw sketches of different machines.</li> <li>2) Identify different forms of material.</li> <li>3) Identify different parts of machines.</li> <li>4) Draw flow of yarn &amp; fabric through the machines.</li> <li>5) Identify different fabric structures, weaves.</li> <li>6) Identify knitted fabric &amp; woven fabric.</li> </ol>	<p><b>01. Introduction to Spinning</b>            Introduction to the principle of manufacturing yarn in ring spinning process.            Overview of the various processes involved in spinning of a yarn by ring spinning system and their objects.            A flow chart showing various processes for carded and combed yarns from blow room to ring frame.            Difference between carded and combed yarn.</p> <p><b>02. Raw Material</b>            Definitions of terms: textile fibre, staple fibre, yarn, and filament.            Properties of textile fibres: essential and desirable.            Classification of textile fibres based on their origin; brief information of fibres.            Properties of cotton fibres: length, strength, fineness, trash, maturity and convolutions.            Objects and brief description of cultivation and picking – manual, mechanical; ginning, baling &amp; pressing.</p> <p><b>03. Study of Spinning Preparatory Processes</b>            Passage of material, object/functioning of following machines; Blow room, carding, draw frame, sliver lap and ribbon lap, comber, speed frame.</p>

**List of Practicals:**

1. Mill visit for overview of spinning process of carded and combed yarn. Visit to ginning and pressing factory.
2. Brief study of modern B.R. process with chute feed to card, high-speed carding process.
3. Brief study of high-speed draw frame, comber lap preparation, comber.
4. Brief study of modern fly frame, modern ring frame.
5. Brief study of doubling, TFO, reeling.
6. Brief study of open end spinning machine, Air jet spinning.
7. Brief study of wrapping and hank/count calculation of materials in spinning.
  
8. Lay out of weaving workshop (sizes, names, speeds, width & HP).

**04. Spinning**

Object of ring frame, passage of material through it.

The quality parameters of the yarn (strength, evenness, imperfection, CV%, count, CV% strength) and some of important norms like, U%, CV%, CSP, CSP and count CV%, single thread strength, hairiness.

Brief idea about modern spinning methods like, open end, friction, air jet, core spun yarn, compact spinning and their main yarn properties.

Brief idea about doubling, TFO and its advantages with respect to yarn properties.

Brief idea about yarn reeling, object, description of method. Conditioning of yarn its advantages.

Yarn numbering system and calculations e.g. count, denier, tex.

Brief description of special yarns and their end uses: fancy yarns, blended yarns, texturised yarns, voile yarns, hosiery yarns, woolen and worsted yarns.

**05. Introduction to Fabric Manufacturing.**

Various methods of fabric forming: (with yarn and without yarn) weaving, knitting, braiding, felting, non-woven fabric manufacturing, and resin bonding.

Description of various processes in weaving and their objects: Winding, warping, sizing, drawing-in, cone dyeing, beam dyeing, pirn winding, weaving. Flow charts for various types of fabrics mentioning the processes involved in manufacturing of these fabrics for plain loom and automatic loom: a) Grey fabric b) Monocolour fabric (dyed warp and gray weft), c) Warp or weft stripes d) Check pattern, e) warp and weft both coloured.

**06. Weaving Preparatory**

**Winding:** Object of winding, yarn passage through modern

<p>9. Passage of yarn through the loom. (Names, objects of primary, secondary &amp; Auxiliary motions).</p> <p>10. Yarn passage through modern winding machine. Important assemblies &amp; their functions</p> <p>Classimat</p> <p>11. Study of warping machine for yarn passage, creel drum and brake.</p> <p>12. Passage of warp through sizing machine. Observe creel, sawbox cylinders, leasing and winding zones.</p> <p>13. Study of knitting machine for yarn path, loop formation, tuck, knit, float &amp; cam.</p> <p>14. Sample analysis (plain, mat, rib, twill &amp; satin)</p>	<p>winding machine, yarn clearer and its function, electronic yarn clearers, Winding of packages for yarn dyeing. Types of cones available to wind packages for dyeing.</p> <p>Information of Classimat and its use on winding machine, features on modern winding machines.</p> <p><b>Warping:</b> Object of warping, Passage of yarn through the machine, Description of creel and head stock.</p> <p><b>Sizing:</b> Object of sizing. Effect of concentration, viscosity on size add-on.</p> <p>General description of sizing machine. Passage of warp through the machine. Characteristics of good beam.</p> <p><b>07.Fabric Forming</b></p> <p><b>Weaving:</b> Objects of primary, secondary, and auxiliary motions. Important defects in the fabrics and their description. Study of dobby, jacquard, and their uses.</p> <p><b>Knitted fabric:</b> introduction, loop structure, warp and weft knitted fabrics, comparison of knitted and woven fabrics, properties of knitted fabrics.</p> <p><b>Non-woven:</b> Process and their applications.</p> <p><b>08. Fabric Structure</b></p> <p>Introduction to interlacements, weaves, and design.</p> <p>The method to represent the warp, weft, and intersection on graph (point) paper with universal convention.</p> <p>Design, draft, denting, and peg plan for following weaves: plain (ornamentation), warp rib, weft rib, matt, twill and its derivatives, twill check, satin and sateen, satin (sateen) checks.</p>
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## II ) OBJECTIVES AND ACHIVEMENTS :

The trainees will be able to :

1. Get the knowledge of various raw materials used in spinning.
2. Predict the properties of yarns produced from the spinning process.
3. Get the skills to identify/differentiate between yarns produced by different spinning methods e.g. ring spinning, open-end spinning etc.
4. Use this knowledge for enhancing, modifying properties of final product of wet processing.
5. The basic knowledge of fabric types and their methods of manufacturing.
6. Study different weaves and end-uses.

**List of Tools , Equipment and Machinery Required for  
“ ADVANCED TEXTILE TECHNOLOGY MODULE ”**

<b>SPINNING MACHINES</b>		
Sr. No.	Name of Item with Specification	Qty. Reqd.
1	Complete B/R line of 4 to 5 beating points with sentcher (single process)	1
2	Carding machine	1
3	Draw frame	1
4	Simplex machine	1
5	Ring frame	1
6	Doubling machine	1
7	Sliver lap machine	1
8	Ribbon lapmachine	1
9	Comber	1

<b>WEAVING WORKSHOP</b>		
Sr. No.	Name of Item with Specification	Qty. Reqd.
1	Power loom for shirting reed space 48"	2
2	Power loom for Blanket reed space 80"	1
3	Power loom fitted with terry mechanism reed space 48"	1
4	Power loom fitted with jacquard 200 hooks reed space 48"	2
5	Power loom fitted with jacquard 400 hook Reed Space 48"	1
6	Power Loom fitted with Jacquard 600 hook	2
7	Reed space 48"	2
8	Power loom fitted with drop box 4x1 48"	1
9	Han loom 40"	4
10	Hand loom fitted with jacquard 200' Hooks	1
11	Sectional Warping Machine with Creel(Creel capacity 208 cones section width 2 mtr.)	1
12	Card Cutting Machine Coarse Pitch	1
13	Card Cutting Machine Fine Pitch	1
14	Fine Pitch Jacquard	1
15	Pim ordinary winding machine 8 spindle	1
16	Automatic (Hacoba)pim Winding 4 Spindle	1
17	Dobby 16 lever	2
18	Cam Dobby 24 levers	1
19	Hollow cop Pim winder 6 spindle	1
20	Pim Changing Loom	1
21	Shuttle less loom	1
22	Air Jet loom	1
23	Waping Machine ( Sectional waping Machine )	1
24	Pin Winding	2

<b>WEAVING WORKSHOP</b>		
Sr. No.	Name of Item with Specification	Qty. Reqd.
26	Hand Loom , Reed Width 24 " & 36 " ( 2 Nos. Each )	4
27	Hand Loom , 48 " with doobby & 60 " with jacquard (1 No. each)	2
28	Power Loom ( for 24 jack doobby fitting )	1
29	Power Loom ( 400 hook jacquard fitting )	1

## Module – ATPT- 05 : TECHNOLOGY OF SIZING , BLEACHING AND FINISHING

### I ) COURSE CONTENT :

PRACTICAL	THEORY
<p><b>Skills to be developed:</b> <b>Intellectual skills:</b></p> <ol style="list-style-type: none"> <li>1) Learn desizing, scouring &amp; bleaching method.</li> <li>2) Identify mercerized goods.</li> <li>3) Understanding mercerization process.</li> <li>4) Understand finishing process.</li> <li>5) Determine effect of different finish ingredients.</li> <li>6) Learn finishing machine.</li> <li>7) Understand finishing process</li> <li>8) Determine effect of different finishing method.</li> <li>9) Learn finish technique.</li> </ol>	<p><b>01. Sizing</b> Objects of sizing, sizing ingredients and their functions, chemistry of sizing ingredients. Properties of adhesives, properties of softeners. Testing of adhesives and softeners.</p> <p><b>02. Grey Inspection</b> Point system, Tag system, Types of stitching, Segregation and rejection, Inspection machines for woven and knit goods.</p> <p><b>03. Shearing and Cropping</b> Importance of grey inspection, shearing and cropping. Study of shearing and cropping machines.</p> <p><b>04. Singeing</b> Object of singeing, Methods of singeing, Various types of gas singeing m/cs., Singeing of yarn, woven, knit, synthetic &amp; blended fabrics., Evaluation of the efficiency of singeing.</p> <p><b>05. Desizing</b> Object, methods of desizing, continuous desizing, desizing of blends, concept of grey chemicking.</p> <p><b>06. Scouring</b> Object, reactions involved in scouring, study of kier, J-box,</p>

<p><b>Motor skill:</b></p> <ol style="list-style-type: none"> <li>1) Acid desizing, open scouring, peroxide bleach of cellulosic material.</li> <li>2) Correlating mercerization efficiency with BAN.</li> <li>3) Resin, softner &amp; OBA application on cellulosic material.</li> <li>4) Using CCM for whiteness index.</li> <li>5) To operate finishing machine.</li> <li>6) Finish of wool, silk, polyester &amp; blends.</li> <li>7) Finishing of garments with different effects.</li> </ol> <p><b>List of Practical ( Sizing &amp; Bleaching) :</b></p> <ol style="list-style-type: none"> <li>1. Desizing of cotton with acids and enzymes.</li> <li>2. Desizing of cotton with hypochlorite.</li> <li>3. Scouring of cotton yarn / fabric by pressure boil technique.</li> <li>4. Open boil scouring of cotton.</li> <li>5. Scouring of coloured goods.</li> <li>6. Combined desizing and scouring of woven and knitted goods.</li> <li>7. Bio scouring of knit goods.</li> <li>8. Scouring of wool and silk.</li> <li>9. Scouring of acrylic.</li> </ol>	<p>JT-10, Jigger. Scouring of cotton, wool, silk, acrylic, nylon, polyester and their blends. Scouring of knit goods, scouring of coloured woven goods, solvent scouring, concept of bio-scouring</p> <p><b>07. Bleaching</b> Object, classification of bleaching agents, Bleaching of cotton, wool, silk, acrylic, nylon, polyester and their blends. Study of bleaching of knitted fabric and top dyed goods. Study of machinery used for semi-continuous and continuous bleaching. Developments in bleaching.</p> <p><b>08. Mercerization</b> Object, various changes brought about by mercerization, concept of cellulose conversion during mercerization, factors affecting the mercerization process. Yarn mercerization, machines used for woven and knitted fabric. Concept of hot mercerization and liquid ammonia mercerization. Test methods like Barium Activity Number, axial Ratio, Lustre ratio, deconvolution count etc. to evaluate the efficiency of mercerization</p> <p><b>09. Preparation of Protein</b> Preparatory process, sequence for woolen goods. Scouring of wool in top &amp; fabric form, Carbonization, Crabbing., Milling, Potting. Preparatory process sequence for silk goods., Degumming of silk.</p>
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10. Scouring of nylon.
11. Scouring of polyester and its blend.
12. Bleaching of yarn, woven and knitted goods.
13. Bleaching of wool and silk.
14. Bleaching of nylon and acrylics.
15. Bleaching of polyester and its blends.
16. Combined desizing, scouring and bleaching of cellulosic material.
17. Determination of BAN of mercerized goods.
18. Determination of Axial Ratio of mercerized goods.

**List of Practical (Finishing) :**

- 1) Preparation of UF, MF, DMEU, DMDHEU and KVS (2 Experiments) Resin finishing of cotton.
- 2) Application of softeners on various fibres (2 Experiments)
- 3) Preparation of Blue tone, Red tone, etc. (2 Experiments)
- 4) Finishing of knitted fabric.
- 5) Application of OBA on various fibres. (2 Experiments)
- 6) Application of Flame Retardant on cotton.
- 7) Application of Water proof, water repellent .
- 8) Use of C.C.M. to study Whiteness Index of Bleached, OBA treated fabrics.
- 9) Finishing of silk fabric.

**10. Classification Of Finishes**

**Object of finishing, temporary and permanent finishes, mechanical and chemical finishes.**

Concept of light, medium and heavy finishes.

**11. Resin Finishing**

Object of resin finishing, mechanism of creasing, types of resin finishing, wash & wear, permanent finishes, Role of catalyst in resin finishing and its classifications. Draw backs of resin finishing, various types of curing processing.

Study of preparation, properties and uses of UF, MF, DMEU, DMDHEU and KVS.

Shop floor practices of resin finishing.

**12. Optical Brightening Agent Finishing**

Chemistry, mechanism and application methods of OBA on cellulosic materials, stripping of OBA and its detection on cellulose.

**13. Flame Retardancy Finishing**

Concept of flame proofing and flame retardancy. Limiting oxygen index and its importance. Factors affecting the flame retardancy, study of temporary, semi-durable and permanent flame-retardants for cotton.

**14. Water Repellent And Soil Release Finishes**

Concept of water proof & water repellent finishes for cellulosic material, object of soil release finishes, various soil release finishes for cotton materials.

- 10) Finishing of wool fabric.
- 11) Finishing of 100% polyester fabric
- 12) Finishing of carbonized goods
- 13) Finishing of p/c, p/w, blends (2 Experiments)
- 14) Study of various wash-down effects – on garments.  
( 3 Experiments)
- 15) Application of enzymes in garment finishing. (2 Experiments)
- 16) Bio-polishing treatment on garments.

**15. Study of Heat Setting**

Mechanism of heat setting, types of setting, process sequence of gray, intermediate and after setting, comparative study of gray, intermediate and after heat setting. Heat setting of 100% polyester, p/c, p/v, nylon and acrylic, various methods to evaluate the degree of heat setting

**16. Spin Finishing**

Objects of spin finish, spin finishing ingredients and their functions. Concept of turbo-electric series and its significance. Chemistry of spin- finishing ingredients. Various methods of application of spin-finish. Spin finishing of texturised polyester.

**17. Anti-pilling**

Mechanism of pilling, Factors affecting pilling. Various physical & chemical methods to minimize pilling.

**18. Foam Finishing**

Definition of foam & blow ratio, properties of foam, stability of foam, various methods to prepare foam, factors affecting stability of foam, methods to determine stability of foam, various methods of foam application.

**19. Special Finishes**

Concepts of mildew proof & rot proof, mildew proof & rot proof finishing, preparation of silk like polyester, soil release finishing of synthetics, finishing of woolen goods. Finishing of hosiery goods, finishing of knit goods.

**20. Garment Finishing**

Study of machines : Drum washer, Tumble drier, Paddle dyeing m/c., Fusing machines for interlining, Laundry equipments.

Wash down effects on garments:

Denim wash – Rinse wash, Sand blasting effect, Peach wash effect, Stone wash effect, Acid wash effect, Chalk wash, feather – washing effect, Ultra soft washing effect.

**21. Recent developments in finishing**

Study of multifunctional finishes, Moisture management finishes, UV protective finishes, Oil repellent finishes

## II ) OBJECTIVES AND ACHIVEMENTS :

Trainees will be able to :

1. Get the knowledge of various sizing ingredients and their role in sizing process.
2. Know the various pretreatments given to different textile fibres and their importance in textile wet processing.
3. Study the check points and testing procedures at various levels in pretreatments.
4. Know the basic concepts and types of finishing.
5. Have the knowledge of various formulations in the finishing.
6. Study the functional finishes.
7. Study the effect of heat setting on physico-chemical changes in synthetic fibres.
8. Get the knowledge of mechanical and chemical finishes
9. Get the knowledge of different finishes applied on textile fabric.
10. Get the knowledge of garment finishing
11. Study the recent finishes for textiles

**List of Tools , Equipment and Machinery Required for  
“ TECHNOLOGY OF SIZING , BLEACHING & FINISHING ”**

Sr. No.	Description	Qty
<b>Textile Printing and Finishing Lab.</b>		
1	Mechanical stirrers (of different motor H.P.)	4
2.	Laboratory padding mangle	1
3.	Laboratory curing chamber	1
4.	Mini steamer loop ager	1
5.	Ph meter	1
6.	Block printing table (wooden/steel)	2
7.	Screen printing table (Industrial) for hand screen printing	1
8.	Colour mixing plastic containers	25
9.	Paste preparation steel mugs of different capacity	20
10.	Measuring cylinders of different capacity (10 ml, 50 ml, 100ml, 250 ml, 500ml, 1lt)	10
11.	Baby screens	10
12.	Industrial screen	10
13.	Flammability tester	10
14.	Hot plate	2
15.	Exposure table for making screen with glass top	1
16.	Computer system (with standard accessories) and software for printing designs for making screens	1
17.	Stainless steel dye baths (double walled) for dyeing of bigger samples	1
18.	Steam iron	1
19.	Simple iron	1
20.	Electric oven	2
21.	Dye baths for smaller samples	4
22.	Rota dyer	1

23.	Spray guns	2
24.	Transfer printing machine	1
25.	Blocks of different types (single colours) (Wooden, metal, casting, pin)	1 each
26.	Colour matching cabinet	1
27.	C.R.A tester	1
28.	Grey scales	1 set
29.	Crock meter	1
30.	Perspiro meter	1
31.	Electric dryer	2
32.	Basket centrifuge	1
33.	Semi automatic washing machine	1
34.	Squeezes for screen printing (of different sizes)	20
35.	Electric balance	1

# Module – ATPT- 06 : TECHNOLOGY OF DYEING

## I) COURSE CONTENT :

PRACTICAL	THEORY
<p><b>Skills to be developed :</b></p> <p><b>Intellectual skills:</b></p> <ol style="list-style-type: none"> <li>1) Understand dying process.</li> <li>2) Learn after treatments.</li> <li>3) Learn dyeing machine.</li> <li>4) Understanding dyeing process for synthetic fabric.</li> <li>5) Learn dyeing machine.</li> <li>6) Learn blend dyeing.</li> </ol> <p><b>Motor skill:</b></p> <ol style="list-style-type: none"> <li>1) Dyeing if cellulosic &amp; protein fibre with different dyes.</li> <li>2) To operate dyeing machine.</li> <li>3) H.T. H.P., carrier &amp; thermosol methods of dyeing.</li> <li>4) To operate dyeing machine.</li> <li>5) Dyeing of polyester blends with different method.</li> </ol>	<p><b>01. Introduction of Dyeing</b>            Basic concepts and requirements of dye and pigment. Definitions of affinity, reactivity, exhaustion, percentage shade, percent expression &amp; diffusion. Classification of dyes Influence of pre-treatments on dyeing properties, selection of dyes &amp; chemicals from ecological view.</p> <p><b>02. Direct Dyeing</b>            General properties, principles and methods of application of direct dye on Cellulosic materials. Classification of direct dyes, various shop floor practices of dyeing of cellulosic materials with direct dye, various after treatments to improve fastness of direct dyed goods, faults and remedies in direct dyeing.</p> <p><b>03. Reactive Dyeing</b>            Concept of hot brand, cold brand, HE, ME &amp; vinyl sulphone reactive dyes. Important steps involved in reactive dyeing, different shop floor practices of reactive dyeing on cellulosic materials, general properties of reactive dyes, stripping of reactive dyes, faults and remedies in reactive dyeing.</p> <p><b>04. Vat Dyeing</b>            General properties of vat dyes, classification of vat dyes. Important steps involved in vat dyeing, various methods of application of vat dyes on cellulosic material, faults and remedies in vat dyeing.</p>

**List of Practicals:**

1. Dyeing of cotton with direct dye.
2. After treatment with direct dyed goods.
3. Dyeing of cotton with hot brand & HE brand reactive dyes.
4. Dyeing of cotton with ME & ramazol reactive dyes.
5. Dyeing of cotton with vat dyes.
6. Dyeing of cotton with solubilised vat dye.
7. Dyeing of cotton with sulphur dye.
8. After treatments of sulphur dyed goods.
9. Dyeing of cotton with azoic colours.
10. Dyeing of wool & silk with basic dye.
11. Dyeing of wool & silk with acid dye.
12. Dyeing of wool & with metal complex dye.
13. Cotton fabric dyeing with jigger, padding mangle and winch.
14. Carrier dyeing of polyester.
15. H.T.H.P. dyeing of polyester.

**05. Solubalised Vat Dyeing**

General properties of solublised vat dyes, important steps involved in dyeing with solublised vat dyes, shop floor practices of dyeing of cellulosic materials with solublised vat dyes, faults and remedies in solublised vat dyeing.

**06. Sulphur Dyeing**

General properties of sulphur dye, important steps involved in sulphur dyeing, different oxidation methods in sulphur dyeing, shop floor properties of dyeing of cellulosic materials with sulphur dyes, stripping of sulphur dyes, faults and remedies in sulphur dyeing.

**07. Azoic Dyeing**

General properties of azoic colours, concept of naphthols and bases, important steps involved in Azoic dyeing, various shop floor properties of azoic dyeing method to improve rubbing fastness of azoic dyed goods, fault and remedies in azoic dyeing

**08. Dyeing with Basic Dyes**

General properties of basic dyes, different retarding agents uses in basic dyeing. Dyeing of wool & silk, important steps involved in dyeing of cotton with basic dyes using mordant, faults and remedies in basic dyeing.

**09. Dyeing With Acid Dyes**

General Properties of acid dyes classification of acid dyes, different methods for level dyeing for wool & silk, dyeing of wool & silk with acid dyes & metal complex dyes.

16. Thermosol dyeing of polyester. Dyeing of texturised polyester.
17. Production of compound shades using disperse dye.
18. Dyeing of acrylic with Basic, Cationic and disperse dyes.
19. Computer colour matching. Preparation of at least 3 formulations for p, p/c, and p/v.
20. Dyeing of Nylon with acid, metal complex & disperse dyes.
21. Dyeing of polyester/ cellulosic blends with various classes of dyes

### **10. Dyeing With Natural Dyes**

Dyeing with natural colours, pigments and oxidation colour classification of natural colouring matters, general properties of natural dyes & pigments, their application on cellulosic materials, faults & remedies in dyeing with natural dye.

### **11. Basic Concept of Dyeing Machines**

Exhaust, semi-continuous, continuous m/cs. Parameters, advantages and disadvantages of various systems.

### **12. Continuous Dyeing Methods**

Dyeing of cellulosic and its blends with pigments. Introduction to mineral khaki, Aniline Black, Phthalogen Blue

### **13. Dyeing of polyester**

Various mechanisms of dyeing of polyester with disperse dye. Various theories of carrier dyeing of polyester. Detailed study of carrier dyeing, high temp, high pressure, thermosol dyeing, and solvent dyeing of polyester. Dyeing of texturised & micro denier PET. Effect of pretreatments and heat setting on dyeing behaviour of polyester. Concept of rapid dyeing techniques. Concept of low liquor dyeing techniques. Faulty dyeing & their corrections. Recent developments of jet dyeing machine, mass colouration of polyester.

### **14. Dyeing of acrylic**

Dyeing of acrylic with basic, cationic, disperse dyes. Concept of defitherm dyeing technique of acrylic. Concept of sancowd dyeing technique of acrylic. Shop floor practices of acrylic dyeing. Use of different retarders in acrylic dyeing.

- 22. Dyeing of polyester/ wool blends with various classes of dyes
- 23. Dyeing of polyester/ acrylic blends with various classes of dyes
- 24. Cross dyeing of polyester / cellulosic blends with various classes of dyes.
- 25. Production of compound shades using azoic colours
- 26. Production of compound shade on polyester / cellulosic blends

**15. Dyeing of nylon**

Dyeing of nylon with various classes of dyes. Shop floor practices of nylon dyeing. Faults & remedies in Nylon dyeing

**16. Dyeing of Blended Union Fabrics**

Pretreatments & dyeing of polyester/cotton, polyester/viscose, polyester/wool, polyester/acrylic, polyester /viscose/acrylic, nylon/wool, wool/ acrylic, acrylic/viscose & polyester/silk

**17. Dyeing of Special Fabrics**

Various methods of dyeing of knitted goods. Terry towel, dyeing of jute fabric with various classes of dyes like direct, sulphur, reactive, basic, acid, etc. Single stage of dyeing of polyester / cellulosic materials, cross dyeing of polyester / cellulosic blends.

**18. Wet Processing of Denim & Top Dyed Goods**

Mechanical & chemical processing of denim & top dyed fabric machinery used for denim. Wet processing of denim fabric.

**19. Process control in dyeing**

Study of various process parameters of dyeing processes.

**20. Quality control in dyeing**

Methods of testing fastness properties of dyed goods to washing, rubbing, light, sublimation & perspiration. Concept and application of Computer Colour Matching in dyeing

## II ) OBJECTIVES AND ACHIVEMENTS :

Trainees will be able to :

1. Get the basic concepts in dyeing of cellulosic material.
2. Know the technology of dyeing of cellulosic material with various classes of dyes.
3. Differentiate the various dyeing techniques and their advantages and disadvantages.
4. Get the basic concepts of dyeing of synthetic fibres.
5. Know application methods of dyeing of synthetic fibres by various dyes.
6. Study process control and Quality control parameters.
7. Study dyeing methods of blended fabrics, denim, and various special fabrics.

**List of Tools , Equipment and Machinery Required for  
“ TECHNOLOGY OF DYEING ”**

Sr. No.	Name of Item with Specification	Qty. Reqd.
1	High Temperature high pressure water bath beaker dyeing machine	1
2	Glycerin bath beaker dyeing machine	1
3	Dye baths	15
4	Laboratory jigger	1
5	Laboratory winch	1
6	Laund rometer	1
7	Padding mangle	1
8	Hank dyeing machine	1
9	Rota dyer	1
10	Basket centrifuge	1
11	Wrap reel	4
12	Electronic balance	2
13	Hot plates	5
14	Semi automatic washing machine	1
15	Refrigerator	1
16	Analytical balance	6
17	pH meter (electronic)	1
18	Measuring cylinders of different capacity (10ml, 50ml, 100ml, 250ml,500ml, and 1lt)	5 each
21	Stainless steel glasses for dye baths	50
22	Electric oven	2
23	Colour mixing containers of plastic and steel (mugs)	20 each
24	Glass rods	200
25	Grey scale (set)	1

# Module – ATPT- 07 : TECHNOLOGY OF PRINTING

## I) COURSE CONTENT :

PRACTICAL	THEORY
<p><b>Skills to be developed:</b>  <b>Intellectual skills:</b>            1) Understand screen preparation.            2) Understand printing process.            3) Learn different styles of printing</p> <p><b>Motor skill:</b>            1) Drawing a design &amp; prepare screen of same.            2) Direct, discharge &amp; resist style of printing.</p> <p><b>List of Practicals:</b>            1) Preparation of screen for printing            2) Batick style of printing            3) Tie &amp; dye style of printing            4) Direct style of printing on cotton using direct dye            5) Direct style of printing on cotton using Reactive dye            6) Direct style of printing on cotton using Azoic colours            7) Magic style of printing, crimp style of printing            8) White &amp; colour discharge on cotton using direct and reactive dyes            9) White &amp; colour discharge on cotton using vat dyes            10) Azoic colour discharge printing on direct dyed ground            11) White &amp; colour resist style of printing on cotton            12) Silk printing with acid dyes</p>	<p><b>1. Introduction To Textile Printing</b>            Preparation of cloth for printing with emphasis on cotton fabric. Printing paste ingredients and their functions, different types of thickeners. Rheological behaviour of thickeners, Selection criteria of thickeners.</p> <p><b>2.Methods of Printing</b>            General principles of methods of printing, study of machinery used for printing such as table, roller, flat bed screen printing and rotary screen printing, preparation of screens for flat bed &amp; rotary screen printing, different types of squeezes for flat bed and rotary screen printing, faults and remedies in roller, rotary &amp; flat bed printing, advantages &amp; limitation of roller, rotary &amp; flat bed printing.</p> <p><b>3.Styles Of Printing</b>            Introduction to the principle of styles of printing.            Direct style of printing on cellulosic material using direct, reactive dyes and azoic colours. Printing paste formulation. Printing operational sequence. Introduction to working of machines like star and loop ager, soaper. Discharge and resisting agents. Print paste formulation, process sequence of white and colour discharge / resist printing on cotton using direct, reactive, azoic and vat dyes.            Special printing effects such as stencil, batick, tie &amp; dye, Khadi, magic and crimp styles.</p> <p><b>4. Printing with Pigments</b>            Principle of pigment printing on cellulosic material. Advantages and limitations of emulsion and synthetic thickeners. Printing paste formulation and process sequence.</p>

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

- 1) Understand different thickening paste.
- 2) Understand printing process.
- 3) Learn different styles of printing on synthetic fabric.

**Motor skill:**

- 1) Direct, discharge & resist style of printing on synthetic fabric.
- 2) Printing of polyester / cotton blend.

**List of Experiments:**

1. Stock & reduction thickening in printing.
2. Direct style of printing on 100 % polyester using disperse dye.
3. Direct style of printing on 100 % polyester using Pigments.
4. Direct style of printing by using carrier.
5. Discharge style of printing of polyester by using various reducing agents.
6. Resist style of printing on polyester.
7. Printing of acrylic fabric by using cationic dyes dyes.
8. Printing of acrylic fabric by using disperse dyes.
9. Printing of nylon with acid dyes.
10. Printing of nylon with disperse dyes.
11. Printing of PET/CO blended fabrics by disperse/ reactive dyes.
12. Brasso style of printing

**5. Printing of wool and silk**

Preparation of printing paste and process sequence for direct style of printing of wool and silk using acid dyes.

**6. Printing of Polyester**

Preparation of polyester fabric for printing, study of various thickeners for synthetic printing. Direct, discharge and resist style of printing on polyester. Recent developments in pigment printing. Various methods of fixation and after treatments.

**7. Printing of Acrylics**

Direct, discharge and resist style of printing on acrylic fabric

Study of cationic dyes and retarding agents

**8. Printing of Nylon**

Various classes of dyes required for nylon printing direct, discharge and resist style of printing of nylon various aftertreatments of printed fabric

**9. Printing of Blended Fabrics**

Direct style of printing of various blends of polyester/ cellulosic with pigment, disperse/ reactive.

Direct style of printing of polyester / wool, polyester/ acrylic & wool/ acrylic.

Brasso style of printing

**10. Transfer Printing**

Process sequence of transfer printing, advantages and disadvantages of transfer printing, mechanism of transfer printing, criteria of paper, ink, and disperse dye suitable for transfer printing

**11. Recent Developments In Printing**

Concept of ink jet printing, carpet printing, natural dyes for printing & faults in printing, their prevention, and correction.

## II) OBJECTIVES AND ACHIVEMENTS :

Trainees will be able to :

1. Know the various thickeners and their selection criteria
2. Have knowledge of various methods of printing.
3. Have knowledge of various styles of printing.
4. Know the printing technique for protein fibres like wool and silk.
5. Get the knowledge of printing of synthetic fibres with different classes of dyes.
6. Get the knowledge of transfer printing.
7. Know the recent developments in textile printing.

**List of Tools , Equipment and Machinery Required for  
“ TECHNOLOGY OF PRINTING ”**

Sr. No.	Name of Item with Specification	Qty. Reqd.
1	Steam Heated Printing Tables	4
2	Free hand Printing Frames (Wooden)	1
3	Tracing Tables	6
4	Slanting Printing Tables	2
5	Flat Printing Table (for block printing)	2

# Module – ATPT- 08 : COMPUTER AIDED TEXTILE DESIGNING AND COLOUR

## I) COURSE CONTENT :

PRACTICAL	THEORY
<p><b>Skills to be developed:</b>  <b>Intellectual Skill:</b></p> <p>1) The students will understand computer added designing process.</p> <p>2) The students will appreciate the tools &amp; facilities provided in CAD systems.</p> <p><b>Motor Skill:</b></p> <p>1) The students will creat textile design with CAD software.</p> <p>2) The students will use different motif /colour patterns as per need and end use of textile design.</p>	<p>01 Textile Repeat</p> <p>02 Colour Reduction</p> <p>03 Scanning</p> <p>04 Scanned Images</p> <p>05 Drawing, Painting and Editing tools</p>

**List of Practiclas:-**

- 1) Development of motifs – natural.
- 2) Development of motifs- Geometrical.
- 3) Development of motifs- Decorative.
- 4) Development of motifs- Abstract.
- 5) Development of shirting design – Stripes.
- 6) Development of shirting design – Checks.
- 7) Development of ladies dress- material design.
- 8) Development of textile design with squire rectangle base.
- 9) Development of textile design with half drop base.
- 10) Development of textile design with diamond base.
- 11) Development of textile design with ogee base.
- 12) Development of textile design with satin base.
- 13) Image development and colour processing for textile printing.
- 14) Development of half tone design.

06 Colour management and auto-colour ways wizard.

07 Colour separation and plotting

08 Auto plotting

09 Draping and Texture mapping

## II) OBJECTIVES AND ACHIVEMENTS :

A Microsoft windows based CAD system for textile design helps manufactures and designs to deliver superior fashion products in a more timely and efficient manner to the market. The software has been devised as a natural extension of a designer's designs process. The workings of the systems have been designed as natural extensions of the manual designing processes. A user is not expected to know much about computers, but knowledge of textile design techniques is beneficial. Through strong development and regular information with its large and prestigious customer base, the products are upgraded to the latest trends in Textile and Computer technology.

**List of Tools , Equipment and Machinery Required for  
COMPUTER AIDED TEXTILE , DESIGN AND COLOUR**

Sr. No.	Name of Item with Specification	Qty. Reqd.
1	PC Pentium-IV, seamer 3300 with laser printer with textile designing software with transparency adaptor	5
2	LCD Projector	1
3	Laser Printers (or desk jet coloured Printers)	1
4	Scanner (Flat bed coloured)	1
5	Dot Matric Printer	1
6	Graphics slates	1
7	Plotters	1
8	Networking must be installed	1
9	UPS (as per requirement)	1
10	CVT (as per the requirement)	1
11	Software Required:	
	a) DOS Completel windows NT	1
	b) . Windows	1
	c) Textile Software	1
	d) Wordstar	1
	e) MS Office	1
	f) LOTUS	1
	g) CAD	1
	h) Graphics Application Software	1
12	Any one software of textile design may be purchased from the following given softwares:	1
	1. Scotweave: Scottish college of Textiles Gala Shiels, UK	
	2. Tex Styler Wonder Weave, Bombay	
	3. Auto Tex for Weaving, PLC Consulting Company, Gwalior House, 37- Rajpur Road, Delhi 110 054	
	4. Textronics Design Systems, 120 Ist Floor Hindustan , Mumbai 83	

<b>Studio (Dark Room)</b>		
1	Zoom Digital Camera 64MB RAM 3.1 Mega pixel	1
2	Tracing Tables 3'x2' with glass top with light arrangement	1
3	Exposing Table (Full Empirical Lockers) (Godrej)	1
4	Enlarger with provision for reproduction from reflection copy	1
5	Drafting Table with lighting arrangement	30

## Module – ATPT- 09 : TESTING OF CHEMICALS AND TEXTILES

### I) COURSE CONTENT :

PRACTICAL	THEORY
<p><b>Skills to be developed:</b> <b>Intellectual skills:</b></p> <ol style="list-style-type: none"> <li>1) Analysis of fastness properties.</li> <li>2) Identify dyes on fibre.</li> <li>3) Analyses pure chemicals.</li> </ol> <p><b>Motor skill:</b></p> <ol style="list-style-type: none"> <li>1) Washing, light, sublimation, rubbing &amp; perspiration fastness.</li> <li>2) Chemical analysis to identify dyes on fibre.</li> <li>3) Titration method to analyze pure chemicals.</li> </ol>	<p><b>01. Testing of dyes</b> Importance of chemical testing, broad idea of testing of dyes, dye-stuff performance tests such as migration test, build-up test, critical temperature test, leveling test, dispersibility test, homogeneity test. Stripping of various types of dyes.</p> <p><b>02. Testing of Textile Auxiliaries</b> Detection of nature &amp; type (ionic, non-ionic, amphoteric) of auxiliaries. Testing of wetting agent (performance), testing of detergent for finding out percentage soil removal, testing of leveling agents for percent leveling factor, comparative performance. Testing of cationic dye-fixing agents by application methods, testing of carriers for performance by dyeing method, testing of dispersing agent. Testing OBA by titration and spectrophotometric techniques.</p> <p><b>03. Testing of Finishing Textile Auxiliaries</b> Testing of resins for determination of solid content, free formaldehyde, total formaldehyde content &amp; performance, qualitative &amp; quantitative analysis of thickeners (appearance, moisture content, pH, free alkali, ash content, viscosity, residual impurities and material index, Tack index). Testing of sequestering agents for determination of chelating value. Analysis of thickeners, Testing of sequestering agents to determine chelation value</p>

**List of Practicals :**

- 1) Determination of washing fastness.
- 2) Determination of Light fastness.
- 3) Determination of Perspiration fastness & Rubbing fastness.
- 4) Determination of Sublimation fastness.
- 5) Identification of Dyes (Direct, Reactive, Sulphur)
- 6) Identification of Dyes (Vat, Azoic, Basic)
- 7) Identification of Dyes on fibres.
- 8) Determination of relative strength of dye using computer colour matching.
- 9) Determination of percent purity of H<sub>2</sub>O<sub>2</sub>.
- 10) Determination of percent purity of Resist Salt.
- 11) Determination of percent purity of Rongalite.
- 12) Determination of percent purity of Stannous Chloride.

**04. Testing of Sundry Chemicals**

Quantitative estimation of acetic acid, citric acid, tartaric acid, oxalic acid, diammonium phosphate, sodium silicate, soda ash, caustic soda, bleaching powder, sodium hypo chlorite, hydrogen peroxide, resist salt, sodium hydro sulphite, thiourea dioxide, rangolite C, safoline and stannous chloride

**05. Testing of Softeners & Binders**

Description of evaluation of softeners (Anionic, cationic, nonionic, creative & emulsion type) for determination of active content and performance by application method, Evaluation of synthetic stiffeners for determining solid content, active content and performance. Description of evaluation of binder for determination of active content, stability & pH

**06. Testing of Textiles**

Description of evaluation of fasteners to washing, rubbing, light, chlorine, perspiration, and sublimation of dyed and printed goods. Qualitative & quantitative analysis of damage. Determination of residual wax on cotton fabric . Determination of whiteness index and retention of whiteness of bleached goods.

## II ) OBJECTIVES AND ACHIVEMENTS :

The trainees will be able to :

1. Get the knowledge of various tests of dyes
2. Get the knowledge of various tests of auxiliaries ( Used for pretreatment, dyeing, printing and finishing )
3. Get the knowledge of testing of textile after processing.
4. Get the knowledge of quality control norms.

**List of Tools , Equipment and Machinery Required for  
“ TESTING OF CHEMICALS AND TEXTILES ”**

Sr. No.	Name of Item with Specification	Qty. Reqd.
1	Computer system (with standard accessories) with software for colour matching	1
2	Spectrophoto meter compatible with the computer for e.g. colour scan	1
3	Colour matching cabinet	1
4	Grey scale set (for fading and fastness)	1
5	Crock meter	1
6	Perspiro meter	1
7	Air conditioner	1
8	Lea strength tester	1
9	Cloth strength tester	1
10	Wrap reel	1
11	Quadrant balance	1
12	Beesley balance	1
13	C.R.A. tester	1
14	Pilling tester	1
15	Twist – Detwist tester	1
16	Bursting strength tester	1
17	Tearing strength tester	1
18	Projection Microscope	1
19	Fibre Length Testing Machine	1
20	Fibre fineness Testing Machine	1
21	Whirling Hygrometer	1
22	Electronic Moisture Meter	1

23	Trash content Analyser	1
24	Analytical/Chemical Balance	1
25	Digital Balance.	1
26	Knowle's Yarn Balance	1
27	Digital Yarn Count Balance	1
28	Beasley's Yarn Balance	1
29	Sliver, Roving Measuring Wrapblock	2
30	Single Yarn Strength and Count Testing Machine	1
31	Multilea Tester	1
32	Ballistic Strength Tester	1
33	Yarn Twist Tester	1
34	Power Driven Wrap reel	1
35	Fabric Strength Tester	1
36	Fabric bursting Strength Tester	1
37	Fabric Abrasion Tester	1
38	Yarn Evenness Tester(Electronic)	1
39	Crimp Meter	1
40	Fabric Air Permeability Tester	1
41	Crease Recovery Tester	1