

**Report of the Committee
to assess the requirement of**

HUMAN RESOURCES

in the

TEXTILES SECTOR

VISION 2010

PART-I

**Ministry of Textiles
Govt. of India**

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CHAPTER – I

Introduction

1.0 Introduction

Concern is often expressed that the process of growth in recent years has not generated employment at the pace required for additional entrants to the labour force. However, in the Textiles sector, the end of textiles import quota regime in the industrial countries offers India a huge opportunity to expand textiles and garment exports and thus generate substantial employment, provided we can compete with other developing countries, - as observed by the Planning Commission in its Approach Paper for the 11th five year Plan. Besides, the growing number of domestic consumers, with increasing per capita consumption of textiles would call for greater manufacturing activities in the textiles and garment industry, thereby increasing the potential for employment scenario.

N.K. Singh Committee had estimated that by 2010 there will be a total investment of Rs.98,550 crores in Textiles Sector, out of which Rs.37,050 Crores in Processing, Rs.10,600 Crores in spinning, Rs.22,950 crores in weaving, Rs.24,000 crores in Garmenting, Rs.3,150 crores in knitting, Rs.1800 cores in Ginning & Processing, Rs.500 croes in Jute and Rs.1200 crores in Silk & wool. Target for Garments export will be US \$ 25 billion by 2010. Similarly New Textiles Policy 2000 aimed at US \$ 50 billion (Garments US \$ 25 billion) as Textiles Exports Target. According to the N.K. Singh Committee, total employment of 82 million in Textiles Sector in 2002 will be enhanced to 91 million by 2006-07. In a recent study by the Credit Rating Information Service of India Limited ([CRISIL](#)), the textiles sector in India is projected to grow from its present level of approximately US \$ 37 billion to US \$ 85 billion by the year 2010. Domestic consumption is projected to rise to US \$ 45 billion, and exports are targeted at US \$ 40 billion. These estimates will see phenomenal growth in the manufacturing, processing and garmenting sectors of the textiles industry, which in turn will throw up the need for an estimated **12 million new jobs**, of which 5 million will be in the organized sector, and remaining 7 million in

supporting and ancillary services. In order to cope with the enhanced requirement of trained man-power on such a massive scale within a short span, the sector will have to be strengthened and augmented for providing this workforce.

The Planning Commission in its Approach Paper for the 11th Five Year Plan have emphasized the need for the manufacturing industry to attain double digit growth. The constraints identified, among others, is an emerging shortage of high quality skills that are needed for the manufacturing industry, which could erode our competitive advantage. Unless this problem is addressed on an urgent basis, we will fail to attain global standards. Emphasis on the faster growth of manufacturing industry, which is a subset of industry, should be around 12% in the 9% GDP growth scenario. Technological modernisation being the key to high industrial growth, labour intensive industries like textiles, will not only require skilled workforce, but also massive vocational training for skill upgradation of the existing workers engaged in the organised as well as unorganised sectors, (including handlooms, powerlooms, sericulture, wool, khadi, etc.) The Textiles sector has the second largest share of employment after agriculture.

Education and training are the most critical elements in empowering people with skills and knowledge and giving them access to productive employment. The 11th Plan, it is proposed will focus special attention on this area. For vocational training and skill development/upgradation, Industrial Training Institutes (ITIs) are proposed to be revamped to achieve the objective of work force training. Similarly, for higher education, for knowledge development, existing institutions must be strengthened and expanded wherever possible. In fact, the Planning Commission envisaged that the 11th Plan must pay special attention to labour intensive manufacturing sectors like textiles to increase the employment intensity of economic growth.

In order to cope with the massive employment generation in textiles, the Ministry of Textiles decided to constitute this Committee to examine the status of

the existing educational and training infrastructure available in the country, both in the public and the private sector, and explore the directions and opportunity of future growth in the human resource segment of the textiles sector. The Committee was asked to:

- Study the status of existing curricula, capacities, and infrastructure of these institutions and make recommendations for their re-orientation, if necessary;
- Assess the need for human development in the light of this and the above projections; and
- Recommend appropriate curricula, and the development of additional capacities and infrastructure that need to be created, identify appropriate methodology for this purpose, and recommend the agencies in the fulfilment of these objectives.

The composition of the Committee is given in Appendix 'A'.

1.1 Methodology

The Committee decided to form three Sub-Committees to deliberate various issues, as under:

1. **Sub-Committee to study existing institutions**, with the following terms of reference:
 - (a) To analyse the existing textiles education and training facilities vis-à-vis industry's requirements and recommend consolidated roles relevant to the current environment;
 - (b) To recommend infrastructure required and grants for HRD
 - (c) To recommend a mechanism to synergize the operation of all institutions and improve their functioning.

2. **Sub-Committee for upgrading Textiles Education** with the following terms of reference:

- (a) To evaluate the current syllabi of all textiles courses, and interact with the industry and recommend new syllabi at the all-India level;
- (b) To evaluate laboratories, libraries, and other infrastructure facilities and make recommendations;
- (c) To recommend appropriate in-plant training needs for each level.

3. **Sub-Committee for identification of the current training needs of different sectors**, with the following terms of reference:

- (a) To evaluate the existing training infrastructure facilities and recommend ideal training facilities required to meet the current industry requirement;
- (b) To estimate funds required and their allocation
- (c) To identify closed public and co-operative textiles units, and study the feasibility of converting them into Textiles Industry Training Institutes. Ideally, these should be situated where the textiles industry is concentrated.

Accordingly, the Sub-Committees carried out Focussed Group Discussions (FGD), examined presentations of various institutes, held seminars, contacted the Principals and Heads of selected Textiles and Home Science Colleges, etc. Desk-research was extensively carried out, and web sites of various training and educational institutes were also accessed. Besides, questionnaires were sent to over 180 institutes to examine their courses, faculties, yearly in-take, infrastructure facilities, laboratories, workshop, support staff, etc.

CHAPTER – II

Study of Existing Textiles Education & Training

2.0 Analysis of Existing Textiles Education & Training

The history of economic development reveals that the textiles industry was the foundation of growth in most of the industrialised countries. The textiles industry acted as the engine of growth in Asian countries like India, Japan, Korea and other South-East Asian countries. It is the oldest and the largest industry in India, established over hundred years ago. With the establishment of composite mills in Mumbai and Ahmedabad as well other parts of the country and jute industry in Bengal, the need for textiles education and training was felt, and a few textiles institutes were established in the early twentieth century, covering conventional technologies in spinning, weaving, dyeing, etc., to develop a workforce that would man the shop floor. Higher education for Indian technologists was mainly imparted in Manchester, Leeds, Bolton, etc., in U.K.

2.1 Scenario of Textiles Education in India

With the growth of textiles industry as a mammoth industry in course of time, a large number of textiles institutes were founded in all corners of the country teaching mainly conventional technologies. There were structured educational inputs, mainly for supervisory and middle level, at pre-employment stages in all these institutes. There was hardly any institute providing skill-development and upgradation at the operators' level, except that after independence when the Textiles Research Associations were established. Training programmes were conducted at these institutes whenever industry approached them for the skill-upgradation of workers. Industrial Training Institutes (ITIs), established in the 1950s, with steep growth in subsequent decades, hardly provided core-competency training in Textiles at operators' level, unlike other engineering disciplines. Vocational training for workers in the pre-or post-employment stages did not develop significantly in a structured and regular fashion. The Indian textiles workforce was generally developed within the industry where newly inducted unskilled workers acquired their skills from skilled colleagues already engaged in the

industry, who passed on their expertise to such unskilled workers. As a result, they inherited the basic expertise along with any flaws and faulty skills. Some of the progressive composite mills did have training arrangements for unskilled and semiskilled workers as in-plant training. Nevertheless, such on-the-job training was more an exception than general practice.

Since the concept of structured textiles education was mainly centered on the employability of high school or intermediate level students and their ability to acquire qualifications, all the textiles institutes started graduating large numbers of qualified personnel in conventional technologies for the industry. In the process, the syllabi were often outdated, and did not keep pace with the latest developments. There were polytechnic level and undergraduate level courses in these institutes and, gradually, institutes of higher learning like the IITs, and a few others, introduced post graduate and PhD level programmes in the 1960^s.

2.2 Existing Institutes engaged in Textiles Education & Training

As per available information published by Nodal Centre for Upgradation of Textiles Education (NCUTE) (2003), there are 53 polytechnics, 36 graduate, and 14 post-graduate level textiles institutes in the country turning out about 5000 students every year. Internet sources, however, revealed that there are 74 polytechnics and 54 graduate, major or minor, Government and private Institutes in the country. With the development of the garment industry, fashion, merchandising and related courses have acquired critical importance. Now, there are 93 diploma, 20 degree and 5 post-graduate level institutes in garmenting set up in the Government and private sectors. Degree level courses are of 4 years duration, Post-graduate level courses are of 2 years duration, and diploma-level for 3 years after High School or middle level education, as the case may be.

From the published literature of NCUTE, the existing structured textiles institutes (Govt. & Private) are given in Table-1.1.

Table – 1.1

(Textiles Technology / Chemistry / Engineering)

Sr.No.	Education Programme	No. of Institutes			Yearly Intake (Nos.)
		Govt./Aided	Private	Total	
1.	Diploma	32	21	53	3110
2.	Degree	20	16	36	1619
3.	Post-Graduate	14	--	14	225

Source: Textiles Institutes of India, published by NCUTE in 2003

N.B. However, an Internet search has revealed that there are 74 diploma, 54 degree, and 14 P.G. level Government/Government-aided private Institutes in the country, engaged in Textiles Education.

The NCUTE publication (2003) has not given details of the Institutes providing training and education in Garmenting, except that there are 18 institutes in Fashion Technology. From our Internet search, we find that the following number of Institutes are engaged in Garmenting and Fashion Technology:

Table – 1.2

(Fashion Technology / Garmenting)

Sr.No.	Education Programme	No. of Institutes	Yearly Intake (Nos.)
1.	Diploma	93	Information not available
2.	Degree	20	
3.	Post Graduate	5	

2.3 **Other Training Institutes**

Besides, training facilities are available with the following bodies:

1. Textiles Research Associations (TRAs) : 8
2. Powerloom Service Centres (PSCs) : 44
3. Indian Institutes of Handloom Technology (IIHT) : 4
4. Weaver's Service Centres (WSC) : 24
5. Industrial Training Institutes (ITI) : 4971 (1243 in Textiles)
6. Home Science Colleges offering Textiles & Clothing Courses: 24
7. Apparel Training & Design Centres (ATDCs) : 14

2.3.1 Textiles Research Associations (TRAs):- There are 8 Textiles Research Associations located at Mumbai, Surat, Ahmedabad, Coimbatore, Ghaziabad and Kolkata. Though engaged in R & D, testing, consultancy, etc., each of them provide training programmes to the industrial workforce depending on the requirement of the industry. One TRA has a full-fledged Textiles Institute at diploma level, and other vocational training.

2.3.2 Powerlooms Service Centres (PSCs):- There are 44 PSCs run by the Textiles Commissioner's Office, the TRAs and the State Governments. These PSCs are located in the powerloom clusters spread through out the country. Besides other services, most of the PSCs conduct training programmes for the powerlooms sector. Most of them have adequate infrastructure like pilot plants, laboratories, etc.

2.3.3 Indian Institutes of Handloom Technology (IIHTs):- There are four such institutes located at Varanasi, Salem, Jodhpur and Guwahati. These institutes mainly provide training for the Handlooms Sector at the Diploma level, and also other skill development to handlooms weavers and dyers.

2.3.4 Weaver's Service Centres (WSC):- There are twenty four Weaver's Service Centres spread over the country. They carry out training mainly for the handlooms weavers for skill development in crafts, and design related to traditional textiles.

2.3.5 Industrial Training Institutes (ITI):- The Directorate General of Employment & Training (DGE&T) initiated the Craftsman Training Schemes (CTS) in 1950, by establishing about 50 Industrial Training Institutes (ITI's) to impart skills in various vocational trades to meet the skilled manpower requirements for the technology and industrial growth of the Country. During the 1990's, growth had been steep and, presently, there are 4971 ITIs (1869 Government and 3102 in the private Sector) with an annual capacity of 7.18 lakhs trainees. Unfortunately, hardcore textiles technology is not a part of their training scheme. 1243 ITI's also offer textiles training, with a yearly intake of 33372. Training in these ITIs is mainly given in the following trades:

- (1) Bleaching;
- (2) Dyeing;
- (3) Block printing;
- (4) Cutting and tailoring;
- (5) Dress making;
- (6) Embroidery;
- (7) Hand weaving of niwar tape;
- (8) Durries;
- (9) Carpet;
- (10) Knitting with hand operated machine; and
- (11) Weaving of silk and woollen fabrics, etc.

Such training normally aims at skill development of individuals for self-employment.

In the Constitution of India, vocational training is on the Concurrent List. The development of training schemes at the national level, formulation of policy, deciding of training standards, norms, evaluation, procedure, examinations,

certification, etc., are the responsibility of the Central Government; whereas, the implementation of training schemes largely rests with the State Governments/UT Authorities. The ITIs, both in the Government and Private Sector are considered as established wings for such vocational training.

Though hard core technologies related to textiles are not included in the ITI's schemes of training at present, the following existing vocational training schemes can be exploited for the training of maintenance and engineering staff of the textiles industry on a larger scale:

- (a) Advanced Tool & Die Making
- (b) Advanced Welding
- (c) Advanced Refrigeration & Air Conditioning
- (d) Electrical Maintenance
- (e) Induction to Engineering Technology
- (f) Machine Tools Maintenance
- (g) Micro Computer/Industrial Control
- (h) Process Control Information
- (i) Production Technology
- (j) Tool Design
- (k) Hydraulics & Pneumatics
- (l) CAD/CAM
- (m) CNC & Control Technology
- (n) Maintenance of PCs & Peripherals
- (o) Industrial Automation

ITI's may be persuaded to relate such courses with the inputs from the textiles industry to make them more relevant to modern machineries and maintenance used in textiles industry. The ITI's (1243) which are conducting low-end vocational training, may be strengthened to take up the training of textiles workers for skill development, skill upgradation, retraining, etc.

2.3.6 Home Science Colleges :- Twenty four such colleges offer courses in Textiles & Clothing to women students at graduation and post-graduation level. Such colleges, under various universities, are spread over a dozen States and Union Territories.

2.3.7 Apparel Training & Design Centres (ATDCs) :- These training centres are devoted to garmenting, with skill development programmes for tailoring, cutting, pattern making, maintenance of stitching machines, automated production, designing, etc. The centres are located at various clusters of the garment industry.

2.4 Feed back from Institutes

In order to collect information and feed back on institutional curricula, over 180 Government and Private Institutes engaged in education and training in Textiles and garmenting were approached with a questionnaire which focussed on eliciting information pertaining to:

1. Courses offered at the Post-graduate level
2. Courses offered at the Degree level
3. Courses offered at the Diploma level
4. Courses offered at the Certificate level
5. Vocational/Skill-development training
6. Infrastructure (Class rooms, Laboratories, Workshops, Auditorium, Seminar rooms, Canteen facilities, etc.)
7. Industrial training/Internship
8. Total Strength of Student intake
9. No. of Faculty
10. Support staff
11. Faculty details (qualification, experience etc.)

12. Department-wise details of machinery, equipment, etc.

13. Any other information relevant to education, training, etc.

However, only 11 Government Institutes and 14 private Institutes were forthcoming. A summary of the information received is tabulated at **Annexure-1**.

We can, nevertheless, draw the following surmise:

- i) Institutes in the Government and Private sector, offer courses in Degree or Diploma level education. A few offer courses at the Post-graduate level.
- ii) Institutes offering vocational training do not cover the gamut of the textiles industry
- iii) Intake of students vary from 10 to 60 in general in various courses.
- iv) Semi private Institutes take 100 to 180 students every year at diploma level in a few courses.
- v) Most of them are approved by AICTE/Directorate of Technical Education of the concerned State Government
- vi) Infrastructure available in these Institutes is of reasonable quality, and in certain cases very good.
- vii) Faculty available in these Institutes is of generally of acceptable standards.
- viii) Degree level courses are of 4 years duration, post-graduate 2 years and Diploma 3 to 4 years.
- ix) Vocational courses vary from 1 week to 1 year.
- x) A few Institutes carry out part-time vocational courses.
- xi) Subjects covered are wide and varied.

Though the information collected is not exhaustive, it reflects a general trend in existing textiles education and the training set-up available in the country. NCUTE Publication (2003) also accepted that existing Government and private Institutes have reasonable infrastructure, faculty, laboratories, etc.

A list of academic institutes is given at **Annexure-2**. Information collected from the Ministry of Labour/AICTE is given at **Annexure-3**. A list of other bodies engaged in textiles & garment training is given at **Annexure-4**.

2.5 Industry Requirements in the current environment

We have accepted the CRISIL estimates for manpower for the purpose of this study.

As envisaged, there will be a requirement of a 12 million workforce by 2010, of which 5 million will be in the core-technological areas of production activities in the Textiles and Garment industry, and the remaining 7 million in supporting and auxiliary services. It will be expedient to plan for the requirement of training of this 5 million technology-driven goals manpower.

Ten to fifteen percent of this additional manpower will be required at the supervisory, middle management levels, etc., in the production facilities. Infrastructure for textiles education is adequate in over 200 textiles institutes spread over the country imparting education at diploma, degree and post-graduate levels. It may be necessary to increase the in-take capacity of these institutes by strengthening their infrastructure. Thus, there may not be major problem in coping with the additional requirement of manpower at this level.

However, considering the current environment and industry's requirements, a major problem is envisaged with our ability up to cope with the massive requirement of skilled workforce at operatives level, like spinners, weavers, dyers, finishers, tailors, maintenance staff for machinery etc. The modernisation of textiles mills with state-of-the-art machineries and plant will only underline the training requirement for even the existing operators to upgrade their skills. Unfortunately, the present training and educational infrastructure,

facilities available with textiles institutes are not adequate to train approximately 4 to 4.5 million of trainees.

The scenario that emerges from our estimates requires planning for the training of over 1 million trainees every year. A detailed worksheet giving the training / education requirements for the textiles industry and garment industry is given separately at **Annexure-5**.

To achieve the target, all the training institutions in the Government and the Private sector, and the Powerlooms Service Centres, IITTs, WSCs, TRAs, ATDCs etc., which are already carrying out industrial training, will have to be restructured/re-oriented by enhancing their infrastructure to equip them to provide such massive training infrastructure. Additionally, an equally large, if not larger, infrastructure will have to be created with participation from the textiles industry and trade.

A major step to cope with the task of massive industrial training will be harnessing the strong infrastructure of ITIs spread in all corners of the country. There are about 5000 ITIs in the country already imparting training to over 7 lakh trainees in disciplines, other than core technology for textiles and garmenting. Creating training facilities and infrastructure in these ITIs for operators training for the textiles industry will constitute a major step to solve the problem of the massive training requirements of the textiles industry.

In this context, the emphasis placed in the Approach Paper of the Planning Commission for the 11th Plan on skill development is relevant, and is quoted below:

“The scope for expanding capacity through private sector initiatives in higher learning must also be fully exploited, while also ensuring that quality standards are not diluted. Unless this is done on an urgent basis, we will fail to global standards.

No society, certainly not at India's stage of economic development, can give everyone high-end skills to make them doctors, engineers, software specialists financial analysts or even provide university level education to all. Industry also requires persons skilled in many specific trades and the situation in this area is not comforting. India has historically lagged behind in the area of technical/vocational training and even today enrolment rates in ITIs and other vocational institutes, including nursing and computer training schools, is only about a third of that in higher education. This is quite the opposite of other Asian countries which have outperformed us in labour intensive manufactures. Our ITIs will have to be substantially expanded not only in terms of the persons they train but also in the number of different skills and trades they teach. The quality and range of their training should keep pace with the changing needs of the economy".

CHAPTER – III

HRD Infrastructure Facilities Required

3.0 Infrastructure Facilities Required

With the dismantling of the quota regime from January 2005 the contours of the global textiles trade have changed dramatically. India's comparative advantage has to be leveraged to convert it into competitive advantage by value addition across the entire chain. India's share in global textiles and apparel trade is expected to double to 6% from current 3%. The growth in domestic market will be fuelled by growing Indian economy, growing at a pace of 8%, creating a sharp rise of the consuming class. The entire textiles trade in India has the potential to reach a turnover of US\$ 100 billion by 2010.

The investment in the textiles sector by 2010 (according to the CRISIL study) is expected to be approximately Rs.1400 billion, of which the Spinning sector is to attract Rs.370 billion, the Weaving sector Rs.250 billion, the Knitting sector Rs.30 billion, the Processing sector Rs.500 billion, and the Garment sector Rs.250 billion. The strengths of Indian textiles industry, as identified, are a wide multifibre raw material base, large and expanding production capacity, flexible production systems, abundant labour, an old textiles tradition, a large domestic market, low import intensity and a strong downstream industry. Its weaknesses are low technology input, **lack of skill upgradation and appropriate training**, traditional management, inflexible labour laws, a fragmented industry and inadequate infrastructure. With the mass scale expansion of the textiles industry in the near future, manpower requirements for skilled and semiskilled work forces, as well as supervising and managerial level will assume a significant role and lead to the review and restructuring of the textiles education and training infrastructure in the country.

As stated, it is expected that over 12 million jobs are likely to be created in the textiles industry and related areas. While there is reasonable infrastructure

for structured education and training at the diploma, degree, and post-graduate levels, facilities available for the training of the workforce at the operatives' level in maintenance and skilled jobs require augmentation and strengthening. Out of the 5 million jobs on the production floor, the largest share will be for skilled and semi-skilled labour, for whom there is no worthwhile training infrastructure available in the country. The garments sector is a relatively new addition to the textiles industry. A massive training and education infrastructure will be a pre-requisite to cope with the huge skilled manpower requirement for this sector.

On the whole, the Indian textiles and garment industry is poised for a quantum leap and has to leverage its competitive advantage in the post-quota regime. Entrepreneurs and existing players are expanding capacities and adopting strategies addressed to the growing consuming class. Industry is striving to improve quality, productivity and efficiency. It is introducing global benchmarks with the support of modern technology and IT solutions. The emerging new technologies in weaving, spinning, processing, nonwovens, knitting, etc., require knowledge-based skilled manpower even at the shop floor. The missing links are orientation towards modern technology, retraining, skill up-gradation, managerial skill, entrepreneurship development, etc., based on a skilled workforce in conventional technologies. The growth of the Indian economy at 7-8%, and its focus on the development of infrastructure augur well for the growth of the industry, provided there is a trained workforce available behind modern machines. A pragmatic approach by all stakeholders in formulating sound textiles education and attendant training systems for the various sectors of the industry cannot be overemphasized.

3.1 Training Need-gaps

In order to examine infrastructure requirements, it will be expedient to examine the training need-gaps.

In the global scenario, especially in the context of new trade regimes, the demand for trained manpower, competent to manufacture quality products, with high productivity, and to handle sophisticated machines, has been increasing rapidly in

textiles and garment manufacturing. Many new technologies of production of fibres, yarn, fabric, and other textiles based products have been devised, and are being commercially exploited. Conventional production techniques like ring spinning, weaving looms, etc., have been supplemented, strengthened or supplanted with newer production technologies with high speed and automation. Textiles today are being used in innumerable functional applications, governed by rigid specifications as part and parcel of material science. New emerging technologies have been introduced in the form of technical textiles, phase changed material, smart textiles, etc. The introduction of CAD/CAM, IT solutions, technical textiles, etc., have led to training need-gaps for textiles technologists and operators, who will have to re-orient their knowledge and expertise in newer areas. Besides, technologists and entrepreneurs require to be retrained not only in their technical and managerial disciplines, but also in merchandizing, quality management, evaluation and laboratory management, interpretation and use of data, I.T. solutions, environmental and social obligations, etc. Training gaps in the decentralised sector, which produces more than 95% of the textiles products require appropriate training inputs for workers, supervisors, middle-management and entrepreneurs. Training need-gaps for the decentralised sector have to be tackled differently in comparison to the organised sector. Garmenting and Fashion technology are relatively new in the Indian textiles scenario. These sectors have substantial potential for the industry, both in terms of export and domestic consumption. Being labour intensive, these sectors will require focussed training for skill-development and skill-upgradation. Training and retraining in these areas will be a wise investment in our human resources, to exploit the full potential of the textiles and garment industry.

Training need-gaps are required to be identified in the following areas:

1. Conventional Sectors like ginning, spinning, weaving, dyeing & processing
2. Garmenting
3. Fashion Designing
4. TUFS related machineries
5. Knitting
6. Nonwovens

7. New emerging technologies
8. Technical textiles
9. I.T. solutions in textiles
10. Maintenance of machinery
11. Powerloom Sector
12. Woollen Sector
13. Silk Sector
14. Jute Sector
15. Handlooms Sector
16. Quality Management & productivity
17. Lab. Testing/evaluation and Lab. Management
18. Entrepreneurship Development in Textiles
19. Textiles Management
20. Environment obligation
21. Work-practices and Communication skills
22. Trade Unionism and Labour laws
23. Training skills for Trainers

In each of these areas, it will be important to study and assess the need-gaps in skill and expertise, right from the operator's level to the top management level. After assessing the micro-level training need-gaps, the training module, course content, training programmes, etc., will have to be formulated and implemented.

3.2 Appropriate Training Infrastructure

After identifying the training need-gaps, an appropriate training infrastructure will be required to be decided at different levels for workers, supervisors, middle management, and top management in the various sectors of textiles industry. The following training modes may be considered in this context:

1. On-the-job training
2. Institutional training
3. Structured training
4. Industry-Institute linkage
5. Training of trainers

6. Training abroad in selected areas
7. Focussed Group training in the decentralised Sector.

In this regard, following infrastructure for training is important:

3.2.1 Operator's training

Since operators comprise the major component of the workforce (more than 60% in the textiles industry and 80% in the garment industry), an 'on-the-job' training mode can be adopted by establishing a training line/division in the factories with knowledgeable trainers from among the skilled employees, or with the help of outside training consultants. In the case of a cluster of factories in a particular area, such training can be conducted by drawing up a common programme. Since the common objective is to derive benefit, a group of factories under different managements can club together their facilities and resources to bridge the skill-gap of their employees. This training mode will be economical and specifically useful for the decentralised sector and the garment industry.

3.2.2 Maintenance staff

There are facilities available in a large number of ITI's, spread throughout the country, to train maintenance staff that can service the manufacturing sector, including the Textiles Industry, in the mechanical, electrical and electronic disciplines. Such facilities should be harnessed to train maintenance staff.

3.2.3 Institutional Training

Institutional and structured training modes can be practiced in over 200 polytechnics and graduate level institutes, which are geographically distributed through out the country. This can take care of the training needs of the local industry. The aim should be focussed more on skill-development and skill-upgradation required instantly for the industry, rather than elaborate theoretical inputs.

3.2.4 Training with Industry-Institute Linkage

A strong Industry-Institute linkage in the training mode has significant potential to tackle training need-gaps. It has been observed that students passing out from the

Institutes require considerable time to be actually relevant and useful to the needs of the industry. There is a lacuna in practical training in these institutes, a hiatus between the teaching in the Institutes and the need and expectations of the industry, particularly for the shop floor level. An Institute-Industry linkage and practice of purposeful and relevant internship should go a long way to bridge the training need-gaps.

3.2.5 Training of Trainers

Textiles and garment industry is geographically distributed at various centres throughout the length and width of the country. Training centres also will have to be located accordingly. In order to standardize training inputs and curriculum, it will be necessary that a core group of trainers are trained from across the country. These will comprise the training resource personnel. There will be need to train such trainers, and a training mode of 'training the trainers' will have to be devised. This core group will eventually train local trainers.

3.2.6 Training in Emerging Technologies

For new emerging technologies like Smart Textiles, Plasma technology, Phase changed Material, Technical Textiles, IT based hi-tech machinery, frontier technologies, etc., it will be necessary to train our technologists and scientists by sending them abroad, because such facilities may not be available in the country.

3.2.7 Training for the Decentralised Powerlooms sector

The decentralised powerlooms sector has grown in an unplanned manner, but the fact is that today our textiles production depends largely on this sector. An appropriate training mode has to be devised to make this sector technically competent, and to enhance its productivity and quality. This sector is manned by an unorganised labour force, which requires intensive training in the fields of machinery operation and maintenance, quality and productivity, etc. The units are fragmented and loaded mostly with outdated machinery and technology. The entrepreneurs are also from the weaker strata of society and lack managerial skills of the desired level. Since this sector, along with the handlooms and hosiery sectors, accounts for more than 95% of basic textiles output, a meaningful and effective training infrastructure will be imperative.

3.3 Frame-work for training

The frame-work for training will have to be devised in the following areas:

3.3.1 Workers

- Structured training for unskilled workers in the pre-employment stage
- Periodic skill-upgradation of workers (Semiskilled and skilled) in the industry with short-term duration for re-orientation.
- Skill-development on new machines in any sector of the industry (by the machinery suppliers)

3.3.2 On-the-job-training

- Operator level
- Supervisory level
- Middle management level
- Executive level

3.3.3 Institutional Training

- Academic
- Technological
- Management
- Quality Management
- IT Solutions
- New emerging technologies.

The institutional training curriculum should be dynamic and the course content must be reviewed periodically to include the latest technology adopted by the industry from time to time. Technical and practical contents should be matched in such a way that the utility and efficacy of the trainees coincides with their deployment.

3.4 Training Infrastructure Requirement

In the context of foregoing, the following infrastructure facilities can be identified:

- i) Most of the institutes engaged in textiles education have adequate infrastructure in respect of laboratories, class rooms, faculty, etc., for academic training. However, the intake of students is limited, and incremental infrastructure may be required to enhance their capacity to cope with the incremental requirement of manpower for the textiles industry.
- (ii) A phenomenal increase in the requirement of manpower for garment industry has been projected. ATDCs, and other similar institutions have to be revamped and their infrastructure has to be multiplied for massive training of tailors, operatives, cutters, pattern makers, maintenance staff, etc.
- (iii) In the garment sector, a large number of private training institutes have come up throughout the country. Their infrastructure, training facilities, etc., may be examined and strengthened, wherever required. In the coming years, private training institutes should be encouraged by appropriate support, particularly in States where unemployment is rampant.
- (iv) There are 44 Powerloom Service Centres spread throughout the country. Most of them conduct training programmes for the skill-development of workers. However, the intake of trainees is restricted due to the limited infrastructure available with them. They can play very important role in training because of their proximity to the decentralised powerlooms sector, close interaction with the industry and linkage to their parent bodies like TRA's. These PSCs will be useful for giving training in the garment sector and also for the training of operatives. Accordingly, infrastructure in the area of garmenting will have to be created in PSCs.
- (v) Four Indian Institutes of Handloom Technology under Central Government, and two in the private sector may be streamlined to undertake training programmes for the textiles industry in addition to

the handlooms industry. This will entail restructuring their infrastructure and strengthening them to undertake industrial training for the skill development of the operatives in the textiles and garment industry. Their infrastructure should be revamped to undertake multifarious activities in training.

- (vi) Similarly, 24 Weavers' Service Centres located throughout the country including remote areas should be restructured by enhancing their infrastructure to train the workforce for skill development and skill upgradation. They can play an important role in training of potential labour force in "catchment" areas from where they migrate to industrial clusters. They need not remain handlooms-centric, but function as integrated centres for textiles related training.
- (vii) Textiles Research Associations can play an important role in the field of textiles education and training, particularly that related to the emerging technologies, modern plant & machinery, quality and productivity improvement, etc. All of them have been conducting routine as well as tailor-made programmes, as required by the textiles industry. However, the intake of trainees is limited, and infrastructure and training facilities have to be strengthened if regular training programmes on a large scale is to be undertaken by the TRAs. Only one TRA, viz., SASMIRA, conducts institutional training with an intake of 1000 students, yearly. Such infrastructure may be created in other TRAs also.
- (viii) New Training Centres may be established in areas from where the labour force normally migrate to the industrial clusters. Sources for this labour force in the textiles and garment industry are in the rural areas of U.P., Bihar, Orissa, A.P., etc. It may be expedient if training infrastructure can be created at the doorstep of such "catchment" areas for the labour force. Tailors, weavers, etc., being community based professions, such institutional training will help unemployed rural youth from other communities to be trained in a profession with such

employment potential. Such training infrastructure can be created in the Weavers' Service Centres, PSCs, ATDCs, etc.

- (ix) Educational Institutes engaged in textiles training are geographically dispersed throughout the country. They may set up 'training centres' as an extension service. Necessary infrastructure facilities will have to be created to make them effective.
- (x) Considering the massive requirement of trained manpower, the infrastructure facilities and the potential strength of the 5000 ITI's, both in the Government and Private sectors, should be harnessed. Training in core technology of textiles is not a part of the training schemes of ITI's so far. Infrastructure for textiles training may be created in these ITI's providing textiles machinery, workshop, laboratories, etc. as well as trainers. An attempt has been made by the Government of India to identify specific ITIs for the textiles industry. Many more will have to be set-up.

3.5 Grants / Finance for HRD

It is obvious that, for training at this scale, great financial investment will be required. This is a complex issue and requires detailed deliberation and examination. While the Government is expected to act as an initiator and catalyst, the stake-holders in the industry will have to share such investment in industrial training which, in the long run, will benefit the industry.

CHAPTER – IV

DOVETAILING OF TRAINING INITIATIVES

4.0 Mechanism to synergize the operation of all Government Institutions

There should be a Central Body to plan, synergize, implement, co-ordinate and monitor all textiles education and training programmes. It is advisable to set up a Steering Committee for Training under the Ministry of Textiles, which will implement, co-ordinate and monitor. The following is an indicative list of members:

1. Textiles Commissioner.
2. Joint Secretary, Ministry of Textiles.
3. Two or more selected Textiles Institutes, Government & Private from different geographical regions.
4. Directorate General of Employment & Training, Ministry of Labour.
5. Two or more Textiles Research Associations (TRAs).
6. D.G., NIFT.
7. Secretary General, AEPC (for ATDCs).
8. Representatives of the State Governments (Technical Education).
9. Jute Commissioner.
10. A representative of the Machinery Manufacturing Association.
11. A representative from Textiles Industry Associations.

The task of synergizing the training course, mode of training, area of training, curriculum and course content, etc., can be assigned to the Office of the Textiles Commissioner, who may co-ordinate the HRD activities in association with the Sardar Vallabhbhai Patel Institute of Textiles Management, and other selected training institutes. Training for skill-development, skill upgradation,

entrepreneurship development, textiles management, etc., will call for a nationwide programme. Effective co-ordination for this training effort will be the key to its success. Syllabi, course-content, and duration will have to be determined for each segment of activities, sector-wise, depending on specific training needs. The main thrust in this regard will be the efficacy and immediate utility of the trainees in their allotted tasks in the industry. Course content should be focussed, and the trainees should not be burdened with irrelevant and extraneous details, which are not primary to the objective of the training.

The objectives of this mechanism to synergize the operation of all institutes, training centres, etc., and improving their functioning may be as follows :

- i) To integrate (depending on their location) the activities of various service centres, such as, powerlooms service centres, weavers' service centres, jute service centres, etc., under Ministry of Textiles, Government of India, to cater to the requirement of any sector of textiles.
- ii) To ensure that institutions, such as, IIHTs, IICT, etc., are converted to include multi-disciplinary training activities in textiles.
- iii) To ensure that Textiles Research Associations, NIFT, ATDC, are equipped to create trainers for training in the various field of textiles.
- iv) To develop curricula which will help Government and private institutions in the textiles sector obtain international recognition in the field of HRD.
- v) To ensure that facilities for standardization and skill recognition are created at every cluster / Textiles Park, etc.
- vi) To ensure that infrastructure for education and training is available at all Integrated Textiles Parks and Clusters.
- vii) To develop a system for the periodic assessment of the efficacy of training programmes, by an independent third party. Such assessment will help in the reorientation and mid-course correction of the training programmes.

CHAPTER-V

Review of the Curricula and Syllabi of Regular Textiles Related Courses

5.0 Industrial Training Institutes (ITI) and Textiles Trades

Practically no ITI has structured Textiles Courses, though the National Council for Vocational Training (NCVT) has prescribed the syllabus and curriculum for some Textiles related courses. Approximately 20 Textiles and Clothing related trades have been included in the 1243 ITIs under the schemes of the Directorate General of Employment & Training, Ministry of Labour, Government of India, on the recommendation of NCVT. However, only a few ITIs run textiles related certificate courses. The standard of these courses does not meet the requirements of the industry. The list of trades relating to textiles, which are included in the curriculum of ITIs, is given below:

List of Trades related to Textiles and clothing included in courses offered in ITI by DGE & T

Sr. No.	S.No. as per the list of trades of DGE & T	Name of the Trade	No. of ITIs in which the trades are available		
			Govt.	Private	Total
1	15	Bleaching, Dyeing & Calico Printing	46	1	47
2	43	Clothing and Sewing	460	237	697
3	57	Dress Making	228	46	274
4	73	Fashion Technology	-	-	-
5	92	Hand Weaving of Niwar Tape, Durries and Carpets	1	-	1
6	110	Knitting (Hosiery)	-	-	-
7	111	Knitting with machines	3	0	3
8	158	Mechanic Sewing Machines	-	-	-
9	185	Pattern Maker	59	1	60
10	198	Printing (Textiles)	-	-	-
11	231	Tailor (General)	-	-	-
12	232	Tailor (Men)	-	-	-

13	233	Tailor (Women)	-	-	-
14	244	Upholster	3	0	3
15	243	Upholster	2	0	2
16	247	Weaver	-	-	-
17	248	Weaving	-	-	-
18	249	Weaving fancy and furnishing fabrics	-	-	-
19	250	Weaving of skill as Woollen fabrics	2	0	2
20	251	Weaving of Woollen Fabrics	4	0	4
Total			808	285	1093

Some ITIs have introduced certain elementary courses like dress making, tailoring, hand knitting, hand weaving, etc. to create self-employment in rural areas. These courses are not directed to the modern textiles industry.

As a first step, 75 to 100 ITIs located at 25 textiles clusters can be upgraded to introduce courses targeted at the current requirements of the Textiles Industry.

It is also felt necessary that selected ITI s / Private Institutes in the labour / workforce “catchment” areas like Bihar, Orissa and U.P should be equipped with all the facilities to conduct courses and training to meet the needs of modern textiles and garment units, located elsewhere (like Surat, and Bhiwandi etc.). Most of the workforce from States like Bihar, Orissa, U.P., A.P., migrates to these industrial clusters, seeking employment.

Currently, the NCVT plays a major role in recognising the ITIs and their syllabus. Its mandate is basically to:

1. Establish and award National Trade Certificates in engineering, non-engineering, building, textiles and leather trades and such other trades as may be brought within its scope by the Government of India
2. Prescribe standards in respect of syllabi, equipment, and scale of accommodation, duration of courses and methods of training
3. Recognise training institutions run by government or by private agencies for purposes of the grant of National Trade Certificates and lay down conditions for such recognitions

4. Recommend the provision of additional training facilities wherever necessary and render such assistance in the setting up of additional training institutions or in the organisation of additional training programs as may be possible.
5. Advises the Central Government regarding distribution to State Governments of the contribution of the Government of India towards expenditure on the Craftsmen Training Scheme. (**Annexure 6**)

The existing system of training, both at the ITI level, and through the Workers' Education Centres, under the Apprentices Act, 1961, does not meet the requirements of the textiles industry. The industry, today, cannot take any advantage from the existing training system especially at the operatives level. The number of specific trades in the ITIs for the textiles sector do not really cater to the textiles industry. The textiles industry can be divided into six major sectors, as given below, and training needs could be planned according to the cluster demand:

1. Spinning	2. Weaving
3. Wet Processing	4. Knitting
5. Garment Manufacturing	6. Wool and Woollen Textiles

Considering the above, the curriculum and syllabus for various courses to be started at ITI level are being suggested in Chapter VI of this report.

5.1 Assessment of Current Textiles Technology courses

There are about 150 technical institutes offering doctorate, postgraduate, undergraduate and diploma courses in textiles technology / textiles manufactures/ Textiles Engineering, Textiles Chemistry/Processing etc., across the country. Their location coincides with the presence of the textiles industry in that area. For example, during the last two decades, a number of Textiles Institutes, both at degree and diploma levels, have been established in Tamil Nadu. 25% of the

national degree level, and 40% of the national diploma level, Textiles Institutes are in Tamil Nadu. This is due to the rapid growth and increased concentration of the Textiles industry in Tamil Nadu.

Many of the old Textiles Institutes have obsolete/limited machinery and lab equipment, inadequate libraries, outdated curricula, small faculty and infrastructure, and negligible industry –institute interaction.

The current curricula of the Diploma and Degree level engineering courses needs to be re-oriented to make them relevant to the present needs of the textiles industry. The indicative alterations in the curricula given below can be introduced mid-course:

III Semester

- a) High Performance Fibres
- b) Textiles Mechanics
- c) Garment Dyeing
- d) Advanced Machineries

IV Semester

- a) In-plant Training of 30 days

V Semester

- a) In-plant Training of 20 days

VI Semester

- a) Fabric and Technical Textiles
- b) Textiles Marketing Management and Entrepreneurship
- c) CAM and IT in Textiles Industry
- d) Fabric Analysis Lab

2. Additions suggested for Undergraduate Program B.E / B.Tech in Textiles Technology (Table-III)

The Model Curriculum for Undergraduate Program in Textiles Technology approved by AICTE in 2001 was considered in detail. The Committee decided to recommend this program with some modification as suggested below:

- a) Practical training of 45 working days in summer following the IInd Year, and another 45 working days after III year, is recommended. Semester VI, kept for Industrial Internship can be used for important courses as suggested in the Table-III, given below.
- b) Table-III also shows the course content of the new courses that can be substitute the AICTE model curriculum for Textiles Technology.

These changes will go a long way in enhancing the employability of students who pass out from these institutes. They will also introduce the required tilt towards practical training which they require to make their transition to the factory level seamless.

Table-III

Branch : TEXTILES TECHNOLOGY

YEAR III

SEMESTER VI

S. No	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME					CREDITS
			L	T	P	Sectional Exam TA	Sectional Exam CT	Sectional Exam TOT	End of Session Exam	SUB TOTAL	
THEORY			L	T	P	Sectional Exam TA	Sectional Exam CT	Sectional Exam TOT	End of Session Exam	SUB TOTAL	
1.		Technical and Smart Textiles	3	1	0	30	20	50	100	150	4
2.		Apparel Technology	3	1	0	30	20	50	100	150	4
3.		Electronics and Instrumentation	3	1	0	30	20	50	100	150	4
4.		Functional Finishes	3	1	0	30	20	50	100	150	4
5.		Value Education	3	1	0	15	10	25	75	100	4
PRACTICALS											
6.		Technical and Smart Textiles Lab	-	-	3	25	-	25	25	50	2
7.		Apparel Technology Lab	-	-	3	25	-	25	25	50	2
8		Electronics and Instrumentation Lab	-	-	3	25	-	25	25	50	2
9		Functional Finishes Lab	-	-	3	25	-	25	25	50	2
10		Design of Experiments and Analytical Technique	-	-	3	25	-	25	25	50	2
		GENERAL PROFICIENCY	-	-	-	-	-	-	-	50	2
		Total	15	5	15					1000	32

TA – Teacher Assessment

CT – Class Test

ESE – End Semester Examination

Total Marks : 1000 Total Periods: 35 Total Credits

Technical and Smart Textiles: 4 credits (3-1-0)

Definition of smart and intelligent textiles. Passive and active functionality. Textiles with high protection and comfort properties. Extreme winter clothing with low heat transmission, heat absorbing, heat storing systems. Phase change materials, incorporation of PCMs in fibres and fabrics. Breathable textiles. Multifunctional textiles with incorporated electronics for integrated communication, music, health monitoring, defence support functions, wearable computers. Environmentally sensitive textiles- photochromic and thermochromic (chameleonic) fabrics, camouflage (radar shielding) fabrics, variable heat absorption surfaces, stimuli sensitive polymers such as temperature, pH, ionic, magnetic sensitive materials, design and their applications to textiles. Fibres as solar cells, Recent advances in multifunctional textiles.

Technical and Smart Textiles Lab: 2 credits (0-0-3)

Laboratory experiments related to the Technical and Smart Textiles course.

Apparel Technology: 4 credits (3-1-0)

Concept of apparel design and proportion. Low stress mechanical properties of fabrics and their effect on apparel production sequences. Anthropometrics; Apparel sizing. Pattern making and grading. Principles of marker making; spreading and cutting. Cutting methods. Quality control in the cutting room. Stitch classification, seam types and applications. Sewing faults, their causes and remedies. Choice of sewing needles and threads. Principles and comparison of machines available for a variety of sewing operations. Work aids-folders, special presser feet, feeding systems. Interlinings-classification and application. Fusing and pressing machines. Garment breakdown analysis. Application of stitch and seam types in apparel construction. Apparel production systems and material handling. Garment dyeing and finishing.

Apparel Technology Lab: 2 credits (0-0-3)

Laboratory experiments related to the Apparel Technology course.

Electronics and Instrumentation: 4 Credits (3-1-0)

Overview of electronics and controls in modern textiles equipments and machines. Overview of basic analog electronics: Elements (R, L, C, V, I), circuit laws and theorems. Overview of basic digital electronics: Gates and ICs. Sensors and transducers

(displacement, position, force, temperature, pressure, flow). Signal Conditioning. Control elements, systems and examples. Data acquisition, analysis, control and automation by microprocessors and micro controllers. Motor and power drives. Power control devices. Some applications of data acquisitions and control systems in textiles and case studies.

Laboratory: Experiments on sensors and transducers (displacement, position, strain, temperature, rotational speed). Basic analog circuits with diodes and transistors. Basic digital Gates. SCR and TRIAC control of motor speed. Data acquisition and control with microprocessors/microcontrollers.

Electronics and Instrumentation Lab: 2 credits (0-0-3)

Laboratory experiments related to the Electronics and Instrumentation course.

Design of Experiments and Analytical Techniques Lab: 2 Credits (0-0-3)

Sampling techniques, sample size, Principles of experimental design. Selecting a statistical design. Running experiments in Blocks, Latin squares. Factorial Designs & Analysis. Fractional factorial experiments. Use of replicates. Techniques of optimisation. Response surface designs. Statistical principles in data analysis. Fitting data. Linear regression with one and several variables. Polynomial models. ANOVA. Use of computers. Software packages. Rank correlation, Coefficient of concordance. Sampling inspection. Acceptance sampling : OG curve, Acceptance sampling by variables, Producer risk condition. Control Chart: Average run length, Modified control limits for averages, Cusum chart.

Functional Finishes: 4 Credits (3-1-0)

Developments in finishing of fabrics and garments. Finishing of microdenier fibre & fabrics. Antibacterial finishes. Moisture management and comfort finishing. Developments in new concepts in textiles finishing. Microencapsulation techniques and

their application in textiles finishing. Nanofinishing of textiles fabrics. Developments in garment finishing.

Functional Finishes Lab: 2 Credits (0-0-3)

Experiments related to Functional Finishes.

Value Education: 4 Credits (3-1-0)

Present state of society achievement and maladies. Notions of progress, development and human welfare. Distinction between pleasure, happiness, good and pleasant, needs and wants. Universal human values. Complementarities of values and knowledge. Typical modern technologies – their impact on mankind. Fundamental characteristics of modern technologies – their relationship to values. Sustainability of modern technologies. Values for harmonious and sustainable developments. Rationales behind universal human values. Practical difficulties in living upto these values. Typical dilemmas. Need for inner transformation. Various approaches towards purification of mind. Concept of holistic development and holistic technologies. Integrating scientific knowledge and human values. Understanding of ethics.

3. Additions suggested for M. Tech Programs in Fibre Science and Technology / Textiles Chemistry and Textiles Engineering / Textiles Technology.

1. M. Tech. programs are of 2 year duration divided into 4 semesters.
2. Students are required to earn 60 credit. One elective course can be offered in II and III semesters.
3. Project work of 18 credits can be allotted and work started at the end of II semester. Project will last for a year during III and IV semesters. Assessment and grading will be done at the end of each semester.

4. M.Tech. Program

Name of the Programme	Fibre Science and Technology/Textiles Chemistry
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Distribution of Total Credits

Program Core (PC)	Program Elective (PE)	Total Credits
54	6	60

Semester wise Distribution of credits

Sem I	Sem II	Sem III	Sem IV	Total Credits
19	17	12	12	60

Scheduling of courses

Semester I					
	Course No	Title	Type	L-T-P	Credits
1	TTL 711	Polymer and Fibre Chemistry	PC	3-0-0	3.0
2	TTP 711	Polymer and Fibre Chemistry Laboratory	PC	0-0-3	1.5
3	TTL 712	Polymer and Fibre Physics	PC	3-0-0	3.0
4	TTP 712	Polymer and Fibre Physics Laboratory	PC	0-0-3	1.5
5	TTL 713	Technology of Melt spun Fibres	PC	3-1-0	4.0
6	TTL741	Coloration of Textiles	PC	3-0-0	3.0
7	TTL742	Theory and Practice of Textiles Finishing	PE	2-0-2	3.0
		Total Credits			19.0
Semester II					
1	TTL 714	Physical Properties of Fibres	PC	3-0-0	3.0
2	TTL 715	Technology of Solution Spun Fibres	PC	3-0-0	3.0
3	TTP 716	Fibre Production and Post Spinning Operation Laboratory	PC	0-0-4	2.0
4	TTL 743	Principles of Colour Measurement and Communication	PC	2-0-2	3.0
5	TTL 763	Technical Textiles	PC	2-1-0	3.0
7		Elective-I	PE	3-0-0	3.0
		Total Credits			17.0
Semester III					
1	TTL 744	Environmental Management in Textiles and Allied Industries	PC	3-0-0	3.0
2		Elective –II	PE	3-0-0	3.0
3	TTD 891	Major Project Part I	PC	0-0-12	6.0
		Total credits			12.0
Semester IV					
1	TTD 892	Major Project Part II	PC	0-0-24	12

List of program Electives for Fibre Science and Technology/Textiles Chemistry M Tech Program

Sr No	Course No	Title	L-T-P	Credits
1.	TTL 772	Computer Programming and it's application	2-0-2	3.0
2.	TTL 761	Costing Project formulation and appraisal	2-1-0	3.0
3.	TTL 717	Advances in Manufactured Fibres	3-0-0	3.0
4.	TTL 718	High Performance Fibres and Composites	3-0-0	3.0
5.	TTL 773	Design of experiment and Statistical Techniques	3-0-0	3.0
6.	TTL 765	Product Development	2-1-0	3.0
7.	TTL 866	Functional & High Performance Textiles	2-1-0	3.0
8.	TTL 724	Textured Yarn Technology	3-0-0	3.0
9.	TTS 890	Independent Study	0-3-0	3.0

M.Tech. Program

Name of the Programme	Textiles Engineering / Textiles Technology
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Distribution of Total Credits

Programme Core (PC)	Programme Elective (PE)	Total Credits
54	6	60

Semester wise Distribution of credits

Semester I	Semester II	Semester III	Semester IV	Total Credits
17	19	12	12	60

Scheduling of courses

<i>Semester I</i>					
	Course No.	Title	Type	L-T-P	Credits
1.	TTL 721	Theory of Yarn Structure	PC	(2-1-0)	3
2.	TTL 722	Mechanics of spinning processes	PC	(3-0-0)	3
3.	TTL 731	Theory of Fabric Structure	PC	(2-1-0)	3
4.	TTL 771	Electronics and Controls for Textiles Industry	PC	(3-0-2)	4
5.	TTP761	Evaluation of Textiles Materials I	PC	(0-0-2)	1
	TTL 714	Physical Properties of Fibres	PC	(3-0-0)	3
		Total Credits			17

Semester II					
1.	TTL 733	Selected Topics in Fabric Manufacture	PC	(2-1-0)	3
2.	TTL 763	Technical Textiles	PC	(2-1-0)	3
3.	TTL 773	Design of Experiments and Statistical Techniques	PC	(3-0-0)	3
5.	TTP762	Evaluation of Textiles Materials II	PC	(0-0-2)	1
	TTL 751	Apparel Engineering and Quality Control	PC	(2-0-2)	3
	TTL 761	Costing, Project Formulation and Appraisal	PC	(2-1-0)	3
		Elective I	PE	(3-0-0)	3
		Total Credits			19
Semester III					
1.	TTD 891	Major Project – Part I	PC	(0-0-12)	6
	TTL 866	Functional and High Performance Textiles	PC	(2-1-0)	3
		Elective II	PE	(3-0-0)	3
		Total Credits			12
Semester IV					
1.	TTD 892	Major Project - Part II	PC	(0-0-24)	12
		Total Credits			12

List of program Electives for Textiles Engineering/Technology M Tech Programme

S.No.	Course No.	Course Title	(L-T-P)	Credits
1.	TTL 732	Computer Aided Fabric Manufacturing	(2-0-2)	3
3.	TTL 762	Management of Textiles Production	(3-0-0)	3
4.	TTL 772	Computer Programming and its Applications	(2-0-2)	3
6.	TTL 764	Process Control in Spinning and Weaving	(3-0-0)	3
7.	TTL 723	Selected Topics in Yarn Manufacture	(3-0-0)	3
8.	TTL 765	Product Development	(2-1-0)	3
10.	TTS 890	Independent Study	(0-3-0)	3

DEPARTMENT OF TEXTILE TECHNOLOGY

TTL711 Polymer and Fibre

Chemistry:

3 credits (3-0-0)

Introduction to natural and synthetic polymers. Terms and fundamental concepts. Step-growth polymerization, Carother's equation. Functionality; Crosslinking. PET manu-facturing. Chain growth polymerization, Free radical polymerization, Kinetics of free-radical polymerization, initiator, termination, chain transfer, Mayo's equation, cage effect, auto-acceleration, inhibition and retardation. Polypropylene manufacturing. Acrylic manufacturing. Atom transfer radical polymerization, ionic polymerization, ring opening polymerization. Nylon-6 manu-facturing. Co-polymerization and its importance. Copolymer equation, reactivity ratio, tailor making of copolymer properties. Techniques of chain polymerization. Bulk, solution, emulsion, microemulsion and suspension polymerization. Chemical Modification of fibres. Polymer solution, Floras theory. Interaction parameter. Molecular weight and its distribution by End group analysis, osmometry, light scattering, ultra centrifugation, gel permeation chromatography, intrinsic viscosity. Spectroscopic methods of polymer characterization such as, FTIR, UV, NMR.

TTP 711 Polymer and Fibre Chemistry Laboratory:

1.5 credits (0-0-3)

Identification of fibres by chemical and burning tests, polymerization of vinyl monomers such as styrene, acrylamide using bulk polymerization, solution polymerization, emulsion polymerization, radiation induced polymerization. Condensation polymerization and interfacial polymerization of nylon-6, Molecular weight measurement, Intrinsic viscosity and end group analysis, preparation of phenol-formaldehyde resin, Analysis of chemical structure by FTIR, UV spectroscopy.

TTP 712 Polymer and Fibre Physics Lab:

1.5 credits (0-0-3)

Characterization of fibres by Infrared spectroscopy, Density measurements, Thermal analysis such as Thermogravimetric Analysis (TGA), Differential Scanning calorimetry (DSC) and Thermo-Mechanical Analyser (TMA), Dynamic Mechanical Analysis (DMA), Sonic modulus, X-ray diffraction studies, Birefringence measurement, Optical microscopy studies, Scanning

Electron Microscopy (SEM) of fibres.

TTL 712 Polymer and Fibre Physics:

3 credits (3-0-0)

Molecular architecture in polymers, Configuration and conformation. Nature of molecular interaction in polymers, Cumulative interaction, Entanglement, Random chain model and rms end-to-end distance. Glass transition temperature (T_g), Factors affecting T_g. WLF equation, Rubber Elasticity, Melting and Crystallization, Models describing fibre structure, Fringed fibrillar and fringed micellar model, One phase model. Requirement of fibre forming polymers. Crystallinity and orientation. X-ray diffraction measurement of crystallinity, orientation, crystal size, small angle X-ray scattering. Measurement of density of fibres, Density crystallinity, Infrared spectroscopy for determination of orientation, crystallinity etc. Optical microscopy for measurement of birefringence. Internal and surface structure by electron microscopy. Thermal methods DSC TGA and TMA for structural investigation. Morphological structure of Cotton, Wool, Silk, Regenerated Cellulose, Polyester, Nylon, Polypropylene, Polyacrylonitrile.

TTL713 Technology of Melt Spun Fibres:

4 credits (3-1-0)

TTL714 Physical Properties of Fibres:

3 credits (3-0-0)

Introduction to fibre structure and requirements of fibre forming polymers. Moisture Relations: Moisture sorption and desorption in fibres. Sorption isotherms, Heats of sorption, Swelling and theories of moisture sorption. Mechanical properties: Mechanism of deformation in fibres. Principles of elasticity and viscoelasticity. Creep and stress relaxation. Boltzmann superposition principle. Dynamic mechanical properties. Model theory of visco-elasticity. Time- temperature superposition principle. Stress- strain relations. Yield and fracture. Fibre friction, its nature, theory, application and measurement. Optical properties: Polarizability and refractive index. Birefringence and its measurement. Thermal Properties; Thermal expansion. Thermal conductivity, Electrical Properties: Dielectric properties, effect of frequency and temperature on dielectric constant. Electrical resistance and its measurement. Static electricity and

measurement of static charge in fibres.

TTL 715 Technology of Solution Spun Fibres:

3 credits(3-0-0)

PAN properties. Solution rheology and its dependence on parameters. Effect of parameters on entanglement density, fibre spinning and subsequent drawing. Various solvent systems. Dope preparation. Wet and dry spinning processes. Effect of dope concentration, bath concentration, temperature, and jet stretch ratio on coagulation rate, fibre breakage and fibre structure. Modeling of coagulation process, properties and structure of dry and wet spun fibres. Dry jet wet spinning of PAN and its advantages. Gel spinning. Melt spinning of PAN. Bicomponent and bulk acrylic fibres. Acrylic fibre line, crimping and annealing, tow to top conversion systems. Viscose rayon process, wet spinning. Zinc sulfate spinning. Polynosics and high performance fibre. Lyocell process, structure and properties. Gel spinning of PE, introduction to high performance fibres and their spinning systems such as rigid rod polymer, liquid crystalline polymers, polylactic acid and spandex fibre manufacturing.

TTP716 Fibre production and post-spinning operations

Laboratory:

2 Credits (0-0-4)

Experiments related to fibres production processes. Effect of moisture and temperature on MFI of PET and PP. Melt spinning of PET, PP & nylon-6 filament yarns on laboratory spinning machines. Single and two stage drawing of the as-spun yarns or industrial POY. Demonstration of high speed spinning machine. Wet and dry heat setting of PET and nylon drawn yarns. Effect of temperature and tension on heat setting. Determination of structure and mechanical properties of as spun, POY, drawn and heat set yarns using DSC, X-ray, FTIR, density, sonic modulus. Effect of shear rate, temperature on polymer solution viscosity using Brookfield Rheometer and ball-fall method. Wet spinning or dry jet wet spinning of PAN copolymers. False twist and air jet texturing processes. Determination of structure of textured yarn under microscope.

TTL717 Advances in Manufactured Fibres:

3 credits (3-0-0)

Profile fibres, hollow & porous fibres, spandex fibres. Biodegradable fibres, polyglycolic acid fibres, polylactic acid fibres, chitosan fibres, their preparation properties and applications. Bicomponent fibres, blended fibres. Fibres in medicine and biotechnology. Aesthetic fibres, bio-mimicking fibres. Membranes. Smart fibres. Comfort fibres. Fibres for Ballistic protection. Microdenier fibre. Spun Bonded and Melt blown nonwovens. Photochromatic fibres. Plasma processing of textiles. Processes for manufacturing of tapes and films.

TTL718 High Performance Fibres and Composites:

3 credits (3-0-0)

TTL721 Theory of Yarn

Structure:

3 credits (2-1-0)

Types of yarn. Role of yarn structure on yarn and fabric properties. Structural parameters of yarn. Twisting forms and yarn contraction. Morphology of staple yarns. Fibre characteristics in sliver, roving and yarns. Comparative analysis of structural characteristics of various types of spun yarns. Influence of fibre characteristics on yarn structure. Tensile behaviour of filament, spun, core spun and elastic yarns. Bending behaviour of yarns. Frictional behaviour of yarns. Rupture behaviour of filament and spun yarns. Geometry of plied structure. Tensile properties of plied structures.

TTL 722 Mechanics of Spinning Processes:

3 credits (3-0-0)

Cotton fibre selection through bale management. Forces on fibres during opening and cleaning processes and its effect. Carding process. Analysis of cylinder load and transfer efficiency. Technological considerations in the design of high production card. Card wire geometry, Fibre configuration in card and drawn sliver. Hook removal and its significance. Sliver irregularity. Fibre movement in drafting field. Suppression of drafting wave. Drafting force. Roller slip. Roller eccentricity and vibration. Fibre fractionation in comber. Combing performance. Principles of autolevelling. Blending of fibres, evaluation of blending efficiency. Analysis of forces on yarn and traveller. Spinning tension in ring and rotor spinning. Spinning geometry, Twist flow in ring and rotor spinning. End breaks during spinning. False twisting principles.

TTL723 Selected Topics in Yarn Manufacture:

3 credits (2-1-0)

Spinning of micro denier fibre. Synthetic fibre spinning on cotton spinning system. Spinning of dyed fibres. Principle of woollen and worsted spinning systems. Influence of high draft on yarn quality. Optimization of production speeds. Production of core and elastic yarns, sewing thread, acrylic bulk yarn, carpet yarn and fancy yarns. Waste fibre spinning. Mechanical and electrical drives. Energy conservation and saving through process optimization. Yarn conditioning. Yarn clearing devices. Selection criteria for aprons, cots and top rollers. Design of bottom drafting rollers. Future expected innovations. Control systems in spinning machinery.

TTL724 Textured Yarn Technology:

3 credits (3-0-0)

TTL731 Theory of Fabric

Structure:

3 credits (2-1-0)

Engineering approach to fabric formation. Fibre, yarn and fabric structure-property relationships. Crimp interchange in woven fabric. Elastica model for fabric parameters and crimp balance. Concept of fabric relaxation and set. Practical application of geometrical and elastica models.

Uniaxial and biaxial tensile deformation of woven fabric. Bending deformation of woven fabric, bending behaviour of set and unset fabrics and bending in bias direction. Bending, Shear and drape properties of woven fabric. Buckling and compressional behaviour of woven fabrics. Mathematical models and their application in the study of tensile, bending, shear, compressional and buckling deformation of woven fabrics.

Structure and properties of knitted and nonwoven fabrics.

TTL 732 Computer Aided Fabric Manufacturing:

3 credits (2-0-2)

Electronic Dobby: Working principle, constructional variants, design of the electronic dobby, drive arrangement, systems for pattern data transfer.

Electronic Jacquard: Working principle, constructional variants, various electronic jacquard systems, selection system, pattern data transfer and management.

CAD for dobby, jacquard, label weaving and carpet: Development of Jacquard designs, process of drafting and sketch design, development of figures, composition of design, geometric ornamentation, arrangement of figures, weave simulation.

Laboratory: Working on electronic dobby and electronic Jacquard, working on CAD, development of various designs on CAD and development of design samples.

TTL733 Selected Topics in Fabric Manufacture:

3 credits (2-1-0)

Development trends in winding, warping and sizing machines for improving quality of preparation and cost, reduction with specific reference to shuttleless weaving machines. Tension control and automation in sizing.

Loom development trends and objectives. Single phase and multiphase looms. Kinematics of sley and heald motion with reference to shuttleless looms. Theoretical analysis of weft insertion in shuttleless looms. Mechanism of warp breakage; Cloth fell position, beat up force and pick spacing. Analysis of let off mechanism, electronic let off and take up. Electronic jacquards. Developments with reference to energy saving, noise reduction and waste control. Electronic data acquisition in a loom shed.

Knitting: Dynamics of knitted loop formation. Design and performance of high speed knitting cams. Developments in knitting machines. Developments in processing machineries for knitted fabrics. Yarn feeding devices on circular knitting machines and design features of positive feeders.

Nonwovens: Fibre/filament arrangement in web and its effect on mechanical properties of nonwoven fabrics. Failure mechanism in different nonwoven fabrics. Effects of machine, fibre and process variables on properties of nonwoven fabrics. Production of spun bonded and melt blown fabrics.

TTL741 Coloration of Textiles:

3 credits(3-0-0)

Developments in dyes and dyeing processes for the dyeing of various textile substrates with various dye classes. Dyeing of blends. Mass coloration of man-made fibres. Development in

printing methods and machines. Direct, resist and discharge styles of printing. Printing of blends. Transfer printing. Physicochemical theories of the application of dyestuffs to textile and related materials, including the thermodynamics and kinetic principles involved. Dye-polymer interactions. Role of fibre structure in dyeing.

TTL 742 Theory and Practice of Textile Finishing:

3 credits (2-0-2)

General overview of the recent technological developments in the area of textile finishing. Special emphasis will be on formaldehyde free finishes for wash-n-wear and durable press applications, fire retardants for apparel and industrial textiles, silicon and amino silicon softeners, fluoro-chemicals for water repellency and soil release functions, water proof breathables-principles and technology involved in their production, surface modifications of textiles and their impact on various functional properties, antistats for synthetic fibres / fabrics, micro-encapsulation and its relevance in textile finishing application, new finishes for different functional and aesthetic requirements.

TTL743 Principles of Colour Measurement and Communication:

3 credits (2-0-2)

TTL744 Environmental Management in Textile & Allied Industries:

3 credits (3-0-0)

Importance of ecological balance and environmental protection. Definition of waste and pollutant. Pollutant Categories and types. International and Indian legislation and enforcing agencies in pollution control. Waste management approaches; Environmental Management Systems-ISO 14000. Environmental impact along the textile chain from fibre production to disposal. Toxicity of intermediates, dyes and other auxiliaries etc. Pollution load from different wet processing operations. Textile effluents and their characterization. Technology and principles of effluent treatment. Advanced colour removal technologies. Recovery and reuse of water and chemicals. Air and noise pollution and its control. Eco labeling schemes. Industrial hygiene and safe working practices. Analytical testing of eco and

environmental parameters. Eco friendly textile processing: waste minimization, standardisation and optimisation, process modification. safe & ecofriendly dyes and auxiliaries. Organic cotton, natural dyes, naturally coloured cotton. Solid (fibre & polymer waste) recycling-recovery of monomers, energy recovery and chemical modification of fibre waste.

TTL 751 Apparel Engineering and Quality Control:

3 credits (2-0-2)

Mechanics of sewing operation: Feeding mechanism, mechanism of generation of needle thread tension, feed dog setting mechanism, stresses and heat generated during sewing, interaction of feed and pressure, sewing dynamics. Measurement and controls in sewing operation: Pressure, sewing speed, thread tension, needle temperature, needle penetration force. Automation in sewing operation.

Fabric quality assessment for clothing industry: Fabric quality requirement for high quality garments, low stress fabric mechanical properties and their effect on sewing operation. Use of FAST and KES system. Fabric mechanical properties and sewing operation interaction: Tailorability and formability. Lindberg theory, optimization of sewing parameters by using fabric mechanical property, optimization of finishing parameters such as steam, pressure, vacuum, for getting desired effect.

Fabric defect analysis for clothing industry: Defect identification, bow and skewness, correlating defect with back process, valueless.

Quality control in apparel manufacturing: Determination of sewability, seam pucker, seam slippage and needle cutting index, evaluation of cutting defect, fusing defect, sewing defect, inspection of dimension, appearance, drape, change in color, shape and spots.

Measurement and selection of sewing thread properties for different fabrics: Optimization of sewing parameters such as ticket number, needle number, yarn tension, stitch density and stitch type for desired sewability.

Selection of lining and interlining fabrics for various shell fabric: Evaluation of lining and interlining fabric, determination of compatibility.

Packaging of finished garment, final random inspection of finished garments, packaging method, safety norms.

Accessories: Buttons, hook and eye, jips, velcro.

TTL761 Costing, Project Formulation and Appraisal:

3 credits (2-1-0)

Cost Concepts: Direct/indirect, Fixed/variable, Total cost. Inventory costing : FIFO, LIFO, Weighted average methods. System of costing : Job, order, batch, process, unit & operating cost joint & byproduct. Cost Standards in Textiles : Cost structure in textile industry, Cost of raw material/labour/utilities. Cost Control : Standard costs, variance analysis, determination of cost per kg of yarn, per kg (metre) of fabric, measures for cost reduction, selling price decision for yarn/fabric. Profit planning : Cost volume - profit analysis, Break Even point. Budgeting, Definition, purpose, types. Financial Statement & Investment Analysis : Profit & Loss account and Balance sheet analysis. Fund flow statement, Ratio analysis, Concept of cost of capital, IRR, DRC, DSCR, ERR, payback period and techniques for calculation.

Project Cycle: Phases of project cycle identification, preparation evaluation, documentation & Supervision. Various functions in project cycle - Technical, commercial, financial, economic, managerial.

Project formulation and Appraisal: Appraisal concept. Need for appraisal, Methodology. Various aspects - market, management, technical, financial and economic, Key financial indicators in appraisal, Investment decision from appraisal report, Post-project appraisal.

Evaluation of Technological Content of Textile Projects: The choice of Technology and their assessment, operating constraint, appropriateness of technology, factors influencing selection, various aspects of technology transfer.

Project Utilities and Environmental Aspects for Textile projects: Power, Steam, Fuel, Water, Compressed air, Air conditioning, Pollution (air, water, ground noise).

Special Appraisals: For Modernisation projects, balancing equipment, expansion and diversification projects (including backward & forward integration).

TTP 761 Evaluation of Textile Material - I:

1 credits (0-0-2)

Characterization of Fibre : Birefringence, sonic modulus, density measurements, thermal analysis, X-rays (orientation and crystallinity). Yarn Testing : Tensile properties, hairiness, cross-sectional studies and yarn preparation.

TTP 762 Evaluation of Textile Material - II:

1 credits(0-0-2)

Evaluation of spliced yarn and sized yarn. Testing of technical textile ; coated fabrics, geo-textiles, filter fabrics. Simulation of knitted and woven structure, comfort properties of fabric, water repellency. Computer colour matching, measurement of U-V protective character of textile material.

TTL762 Management of

Textile Production:

3 credits (2-1-0)

Indian Textile Industry: Structure, production and exports. Textile Policy. Sickness of Textile Industry- Analysis and options. Essentials of production management, production systems, classification. Material management: Role of material management techniques, purchase management, acceptance sampling and inspection, vendor rating system, inventory management. Production, planning and control: types of production systems and problems of planning and control, product section design, process planning, forecasting, planning of batch, mass and job shop system. Machine balancing. Layout and material handling. Machine assignment and allocation of jobs. Maintenance management: maintenance concepts, maintenance strategies, maintenance planning. Productivity and improvement techniques. Quality management: Introduction to TQM, concepts of value and quality assurance, total quality control, quality circles, ISO 9000. Marketing management: fundamental of industrial marketing, industrial buyer behaviour model. Marketing: systems selling, role of service, marketing planning and marketing strategies. Enterprise resource planning: Role of information in managerial decision making, information needs for various levels of management, decision makers, management information system, resource monitoring and control. Product mix. Case studies.

TTL763 Technical Textiles:

3 credits (2-1-0)

Definition, classification, products,

market overview and growth projections of technical textiles. Fibres, yarns and fabric structures in technical textiles and their relevant properties. Filtration: Textile and other filter media for dry and wet filtration. Mechanisms of separation. Requirements for good filter media and filtration. Fibre and fabric selection for filtration.

Geotextiles: Types and application of geosynthetics. Functions and application areas of geotextiles. Fibres and fabric selection criteria for geotextile applications. Mechanics of reinforcement, filtration and drainage by geotextiles. Soil characteristics. Methods of long term prediction of geotextile life and survivability in soil.

Automotive Textiles: Application of textiles in automobiles. Requirement and design for pneumatic tyres, airbags and belts. Methods of production and properties of textiles used in these applications.

Sewing threads, cords and ropes: Types, method of production and applications. Functional requirements, structure and properties.

Miscellaneous: Functional requirements and types of textiles used for paper making, agricultural, architectural, packaging and footwear.

TTL764 Process Control in Spinning & Weaving:

3 credits (3-0-0)

Optimum fibre-mix for various end use requirements. Yarn realization. Waste control in blowroom and card for all types of fibres spun on cotton system. Minimisinglea count variation. Controlling yarn irregularity, imperfections and faults. Yarn tenacity and elongation. Hairiness. Machinery audit. Indices of productivity. Production of high quality export yarns. Trouble Shooting, some case studies.

Role of ambient temperature and humidity. Life of accessories. Workload.

Principles for control of productivity in different sections, Contribution of control in yarn, winding, warping, sizing & weaving to the cost of production in fabric manufacture.

Splicing, machine allocation and load distribution. Control of migration in sizing, size droppings, sizing materials.

Loom allocation. Control of value loss in fabrics through evaluation & grading of fabric defects. Temperature and humidity

control & its effect on performance. Control of loom accessories. Control of loss of efficiency by snap study. Controls in the process of high twist yarns, blended yarns, filament yarns in warp and weft.

Controls in the winding for processing yarns for dyeing & knitting. Controlling sloughing off during winding, warping & weaving. on-line data system and its use in controls.

TTL765 Product Development:

3 credits (2-1-0)

Overview of developments. Scope of product development in textiles and clothing. Designing for functions aesthetics. Designing for apparel, clothing and industrial applications. Product improvement and product innovations in textiles. Demand estimation and product development objectives. Interaction between-properties of fibre, yarn, fabric and garments properties. The product development process - requirements, key characteristics, recourses, conceptual design & technology selection, material selection, sampling, design and evaluation. Design logic, specifications, costing, manufacturing strategies and evaluation of new products. Standards, testing and specifications for new products. Case studies from the point of view of developing textile products for selected end use applications.

TTL771 Electronics and Controls for Textile Industry:

4 credits (3-0-2)

Overview of electronics and controls in modern textiles equipments and machines. Overview of basic analog electronics: Elements (R, L, C, V, I), circuit laws and theorems. Overview of basic digital electronics: Gates and ICs. Sensors and transducers (displacement, position, force, temperature, pressure, flow). Signal Conditioning. Control elements, systems and examples. Data acquisition, analysis, control and automation by microprocessors and micro controllers. Motor and power drives. Power control devices. Some applications of data acquisitions and control systems in textiles and case studies.

Laboratory: Experiments on sensors and transducers (displacement, position, strain, temperature, rotational speed). Basic analog circuits with diodes and transistors. Basic digital Gates. SCR and

TRIAC control of motor speed. Data acquisition and control with micro processors/ micro controllers.

TTL772 Computer Programming and its Applications:

3 credits (2-0-2)

Fundamentals of Computer Programming, Programming Methodology: Structured Programming and concepts of Object-Oriented Programming.

Programming in C++ - Statements and Expressions, Control statements. Structure, Functions: Function Overloading etc.

C++ as Object-Oriented Programming Language- Classes and Objects, Data Abstraction, Inheritance - Multilevel and Multiple inheritance etc., Polymorphism - operator overloading and virtual functions, file handling.

Application development using C++.

TTL773 Design of Experiments and Analytical Techniques:

3 credits (3-0-0)

Sampling techniques, sample size, Principles of experimental design. Selecting a statistical design. Running experiments in Blocks, Latin squares. Factorial Designs & Analysis. Fractional factorial experiments. Use of replicates. Techniques of optimisation. Response surface designs. Statistical principles in data analysis. Fitting data. Linear regression with one, and several variables. Polynomial models. ANOVA. Use of Computers. software packages.

Rank correlation, Coefficient of concordance. Sampling inspection. Acceptance sampling: OC curve, Acceptance sampling by variables, Producer risk condition.

Control Chart: Average run length, Modified control limits for averages, Cusum chart.

TTL 866 Functional and High Performance Textiles:

3 credits (2-1-0)

Protective clothing: Clothing requirements for thermal protection, ballistic protection, UV-protection, protection from electro-magnetic radiation and static hazards, protection against micro-organisms, chemicals and pesticides. Design principles and evaluation of protective clothing.

Medical Textiles: Textiles in various medical applications. Application oriented designing of typical medical textiles. Materials used and design procedures for protecting wounds, cardiovascular application, sutures etc.

Sportswear: Clothing requirements for different sports. Development of highly functional fibres, yarns and fabrics for temperature control and moisture management. Stretch, bulky and light weight fabrics.

Composites: Two and three dimensional fabrics and triaxially braided materials for composites. Production and properties of performs and composites. Properties and uses of rigid composites.

Stimuli sensitive intelligent textiles - their production, properties and applications. Smart textile incorporating functional devices.

Miscellaneous: Glass, ceramic and metallic fibres and their textile products.

TTS890 Independent Study (Fibre Science & Technology):

3 credits (0-3-0)

Student should undertake a research oriented activity including software development, machine design and

development, instrumentation, product and process development or indepth study of a subject of outside the regular courses offered in the programme. This study should be carried out under the guidance of a faculty member. The subject area chosen by the student should be sufficiently different from the area of major project being pursued by the student. The student must submit a detailed plan of work for the programme coordinator before approval of registration for the course.

TTS891 Independent Study (Textile Engineering):

3 credits (0-3-0)

Student should undertake a research oriented activity including software development, machine design and development, instrumentation, product and process development or indepth study of a subject of outside the regular courses offered in the programme. This study should be carried out under the guidance of a faculty member. The subject area chosen by the student should be sufficiently different from the area of major project being pursued by the student. The student must submit a detailed plan of work for the programme coordinator before approval of registration for the courses.

TTD891 Major Project Part-I (Fibre Science & Technology):

6 credits (0-0-12)

TTD892 Major Project Part-II (Fibre Science & Technology):

12 credits (0-0-24)

TTD893 Major Project Part-I (Textile Engineering):

6 credits (0-0-12)

TTD894 Major Project Part-II (Textile Engineering):

12 credits (0-0-24)

5.2 Textiles Management Course

For development of managerial cadre manpower for textiles industry, recently a textiles management school has been set-up at Coimbatore by the Ministry of Textiles (SVPITM). This management school is yet to establish its infrastructure. Being a new institute the course content needs to be reviewed to meet the requirements of the industry.

Currently, this institute is offering two or three programmes at a time with a limited number of faculty and infrastructure facilities. The Institute should have more number of visiting faculty members (drawn from the industry), and reputed institutes like IIM, IIFT, IIT, NIFT. Course curriculum should have industry exposure and training. This would facilitate to develop the brand image of the institute.

CHAPTER VI

CURRICULA AND SYLLABI OF TRAINING COURSES

The proposed courses and curricula and syllabi can be divided into the following 4 parts:

1. Refresher courses of up to 15 days for persons already engaged / working in various sectors of textiles industry. (Textiles and clothing industry)
2. Short term courses up to 90 days for fresher in various sectors of textiles industry.
3. Short term courses of 90 days, (up to 3 months) for ITI fitters or candidates possessing education in engineering and who desire to seek employment as fitters / jobbers / technicians in various sectors of textiles industry.
4. 2 year regular course in an ITI in trades relating to Textiles, (Technician / Mechanic) for various sectors of the textiles industry.

6.0 REFRESHER COURSES:

Course Objective

- This would help the trainees in terms of updating and upgrading their skills to enable them to bridge the gap between their present skills and the latest developments in the textiles industry.

Target Group

- Meant for people who are already working in the Textiles and clothing Industry and have knowledge of their line of activity.

Course Content

- They will be exposed to advance training in areas of operation, technology, quality control, productivity, production planning etc as the case may be.

Training Module

- The syllabus for each course can be divided into two parts namely, Theoretical and Practical.
- The course content would vary according to the activity / trade / department.

The curriculum and syllabus for the following refresher courses is enclosed in Part II of this report as per the Annexure indicated below

1. Spinning :

- | | |
|---|--------------------|
| a) For Skilled Workers - | Annexure 7 |
| b) For Operatives - | Annexure 8 |
| c) For Fitters, Jobbers And Technicians - | Annexure 9 |
| d) For Supervisors - | Annexure10 |
| e) For Departmental Incharge - | Annexure 11 |

2. Weaving:

- | | |
|---|--------------------|
| a) For Skilled Workers - | Annexure 12 |
| b) For Operatives - | Annexure 13 |
| c) For Fitters, Jobbers and Technicians - | Annexure 14 |
| d) For Supervisors - | Annexure 15 |
| e) For Departmental Incharge - | Annexure 16 |

3. Knitting:

- | | |
|---|--------------------|
| a) For Skilled Workers - | Annexure 17 |
| b) For Operatives - | Annexure 18 |
| c) For Fitters, Jobbers and Technicians - | Annexure 19 |
| d) For Supervisors - | Annexure 20 |
| e) For Departmental Incharge - | Annexure 21 |

4. Processing

- | | |
|---|--------------------|
| a) For Skilled Workers - | Annexure 22 |
| b) For Operatives - | Annexure 23 |
| c) For Fitters, Jobbers and Technicians - | Annexure 24 |
| d) For Supervisors - | Annexure 25 |
| e) For Departmental Incharge - | Annexure 26 |

5. Clothing (Garment / Made ups)

- | | |
|---|--------------------|
| a) For Skilled Workers - | Annexure 27 |
| b) For Operatives - | Annexure 28 |
| c) For Fitters, Jobbers and Technicians - | Annexure 29 |
| d) For Supervisors - | Annexure 30 |
| e) For Departmental Incharge - | Annexure 31 |

6.1 SHORT TERM COURSES

Target Groups.

- Meant for people who do not have prior experience / adequate knowledge of the textiles and clothing industry, but possess the education required for particular the job.

Course objectives

- Meant for those who are keen to start their career in the textiles and clothing industry.
- Equip the individual with the requirements for a job in the textiles industry.

Course content

- Further orientation will be given in their area of preference or with respect to the industry needs.
- The level of subject coverage and practicals, etc., will vary in accordance with the academic qualification of the candidate, and the nature / level of employment desired. The probable minimum qualification can be pegged at 8th Std. Pass / Fail.
- The course content can vary according to the department.

Course modules

- The course is divided into two parts, namely theoretical and practical, including Industry visits, inplant training, as the case may be.

The curriculum and syllabus for following short term courses are enclosed in Part II of this report as per the Annexure indicated below :

1 . Spinning :	
a) For Skilled Workers -	Annexure 32
b)For Operatives -	Annexure 33
c) For Fitters, Jobbers and Technicians -	Annexure 34
d) For Supervisors -	Annexure 35
e) For Departmental Incharge -	Annexure 36
2. Weaving:	
a) For Skilled Workers -	Annexure 37
b)For Operatives -	Annexure 38
c) For Fitters, Jobbers and Technicians -	Annexure 39
d) For Supervisors -	Annexure 40
e) For Departmental Incharge -	Annexure 41
3 Knitting:	
a) For Skilled Workers -	Annexure 42
b) For Operatives -	Annexure 43
c) For Fitters, Jobbers and Technicians -	Annexure 44
d) For Supervisors -	Annexure 45
e) For Departmental Incharge -	Annexure 46
4. Processing	
a) For Skilled Workers -	Annexure 47
b) For Operatives -	Annexure 48
c) For Fitters, Jobbers and Technicians -	Annexure 49
d) For Supervisors -	Annexure 50
e) For Departmental In charge -	Annexure 51
5. Clothing (Garment / (Made ups) :	
a) For Skilled Workers -	Annexure 52
b)For Operatives -	Annexure 53
c) For Fitters, Jobbers and Technicians -	Annexure 54
d) For Supervisors -	Annexure 55
e) For Departmental Incharge -	Annexure 56

6.2 SHORT TERM COURSES FOR ITI FITTERS ETC.

Target Group

- This course is meant for those who seek to work or are working in jobs at the level of fitters / technicians, jobbers, etc., in the textiles industry. The minimum qualification can be pegged at ITI or 10th Class.

Course Objectives

- To give practical orientation to unskilled workers who intend to take up a career as fitters / jobbers / technicians

Course Module

- The syllabus can be divided into two parts, namely, theoretical and practical, including industry visits and in plant training.

Course Content

- The course content can vary according to the department. It should include machine maintenance, viz., fitting, greasing, lubrication, gauzing, controlling temperatures, etc.

The curriculum and syllabus for the following short term courses for ITI fitters or candidates who possess education in the given engineering field are enclosed in Part II of this report as per Annexure indicated below:

- | | |
|---|-------------------------------|
| 1. Training for Textiles Technicians (Spinning)- | Annexure 57 |
| 2. Training for Textiles Technicians (Weaving)- | Annexure 58 |
| 3. Training for Textiles Technicians (Knitting)- | Annexure 59 |
| 4. Training for Textiles Technicians (Processing)- | Annexure 60 |
| 5. Training for Textiles Technicians (Clothings)- | Annexure 61 |
| 6. Training for Textiles Technicians
(Woollen Textiles & Clothing) - | Annexure 62 |
| 7. Others - | Annexure- 63,64 and 65 |

6.3 TWO (2) YEAR REGULAR COURSE IN ITIs IN TEXTILES AND CLOTHING

Target Group

- This course is meant for those who seek to work in the textiles engineering field after passing the 10th Standard

Course objective

- Equip candidates to be appointed directly in the textiles industry at the supervisory level and /or start their own enterprise.

Course Module

- Divided into theoretical, practical and industry visits including in-plant training.

Course Content

- Course syllabus will vary according to the department, like spinning, weaving, textiles mechatronics, processing, knitting and garmenting, woollen textiles and clothing.

The curriculum and syllabus for the following Two (2) year regular courses for ITI (textiles and clothing) are enclosed in Part II of this report as per the Annexure indicated below

1. Training for ITI certificate (Spinning)- **Annexure 66**
2. Training for ITI certificate (Weaving)- **Annexure 67**
3. Training for ITI certificate (Knitting / garmenting)- **Annexure 68 & 69**
4. Training for ITI certificate (Processing)- **Annexure 70**
5. Training for ITI certificate (Mechatronics)- **Annexure 71**
6. Training for ITI certificate (Woollen Textiles & Clothing) - **Annexure 72**

CHAPTER VII

SECTOR WISE TRAINING REQUIREMENT IN TEXTILES INDUSTRY

7.0 Sector-wise Manpower requirement vis-à-vis Investment:

The expected manpower requirement vis-à-vis investment (sector-wise) for the period from 2006-07 to 2010-11 is as follows as per the estimation by the Office of the Textiles Commissioner in consultation with industry, TRAs, and CRISIL Report :

Table-7.1

Expected Man Power Requirement vis-à-vis investment (Sector –wise)

S. No.	Sector	Investment (In Crores)	Additional capacity	Man Power Requirement (All Categories) (In Lakhs)
1	SPINNING	45,000	15 Million Spindles (31)*	5.75
2	WEAVING	30,000	84,000 Looms	1.57
3	KNITTING	10,000	21,000 M/cs (30,000)*	0.92
4	PROCESSING	30,000	75000 Million Metres	1.76
5	GARMENT	25,000	11.25 lakhs M/cs (18.75)*	40
	TOTAL	1,40,000	* Total including Replacements-	50.00

The existing work force in the various sectors of Textiles Industry in the category of skilled helpers, fitters, operatives, technicians / jobbers, supervisors and production in charge will also be required to be trained to cope with the operation, maintenance and production pattern of the modernized / technologically upgraded machinery / units. This will entail a relook / review / modification the existing curricula, syllabi, facilities, and capacity available for the various courses and training programmes relating to Textiles and Clothing Industry.

The assumption for these estimates are based on the level of investment projected by the CRISIL study, and prevalent practices in the textiles industry:

- There is likely to be an investment of Rs. 1, 40,000 crore in the textiles manufacturing & garment sectors.
- Certain norms for manpower have been taken from industry. For example, 18.24 persons for 1000 spindles in spinning sector.
- The investment is distributed in the various parts of the country – projecting the present growth pattern.

7.1 HRD gap assessment & proposal for training:

Sector-wise existing training facilities and the expected manpower requirement for the next 5 years has been worked out, based on the above presumptions.

7.1.1 HRD PROPOSALS FOR SPINNING:

Currently, SITRA, ATIRA and SIMA are the major organizations which offer formal training programmes to the spinning sector. In addition, around 100 Textiles mills have their own formal/informal training centres whose trainers have been trained by these organizations. These Textiles mills have also developed some training infrastructure facilities under the guidance of these organizations

The Southern India Mills Association (SIMA), the single largest employers' organization in India, render services to the Textiles Industry in the field of Industrial Engineering and HRD to improve their competitiveness by controlling the cost of production. The Association has conducted over 1000 HR programmes covering the Textiles employees at all level from unskilled worker to Chief Executives including the trade union leaders. The work norms recommended by the Industrial Engineering Division of the Association is widely accepted and recognised by all the Trade Unions and workmen across the country.

Present training capacity of the existing institutions for spinning and the expected manpower requirement in spinning sector for the next 5 years is given in the following tables

Table-7.2

Existing Institutions for Spinning Operative Trainings

Sl. No	Institution	Present training capacity / year
1	Textiles Research Associations	4,000
2	SIMA	2,000
3	In plant training	9,000

Table-7.3

Expected Man Power Requirement in Spinning Sector for next 5 years (2006-07 to 2010-11)

S. No.	Category	Man Power Requirement For Additional Spindles (15 millions) for Next 5 Years					
	Regions -->	Norms (per 1000 Spls)	South	North	East	West	Total
	Investment % -->		50%	25%	-	25%	100%
	Spindles(Millions)		7.5	3.75	-	3.75	15.00
1	Preparatory	11.78	88377	44188	-	44188	176753
2	Spg. Siders + Doffers	8.48	63631	31816	-	31816	127262
3	Bobbin carriers & Sweepers	2.12	15908	7954	-	7954	31816
4	Cone winder	3.54	26513	13256	-	13256	53026
5	Packing dept	2.83	21210	10605	-	10605	42421
6	Fitters,Maintenance & Ele	7.07	53026	26513	-	26513	106052
7	Total	35.82	268665	134333	-	134333	537330
	Management	2.51	18840	9420	-	9420	37680

The present training capacity of TRAs, SIMA, Spinning Mills (in plant training) in spinning operatives training is approximately 15,000 persons in a year. The expected Manpower requirement for additional 15 Million Spindles during the next 5 years would be 5.75 Lakhs to attend preparatory, Spg. Siders & Doffers, bobbin carriers, cone winding packing, fitting, maintenance, electrical and management functions.

7.1.2 Proposals for Training in Spinning

To meet the expected skilled man power requirement of 5.75 lakh for the next 5 years i.e upto 2010-11, the following HRD programmes are suggested

- TRAs, SIMA and Spinning Mills (in plant training) would continue to train around 15000 personnel per annum and there is no necessity to add to the existing capacity. Only some upgradation of modern infrastructure at the rate of 20-25 lakh Rupees may be done in 2-3 TRAs.
- All Machine suppliers, who are taking benefit under TUFs can be asked to train compulsorily at least 5-10 persons per 1000 spindles. M/s. Lakshmi Machine works, Coimbatore has already been giving some training in its campus, which is largely limited to mechanics. The scope of this training must be increased to include new entrants in this field. The list of potential trainees can be maintained with the Regional Offices of the Textiles Commissioner.
- Mills with capacity of more than 20,000 spindles should have proper training facilities. If possible, they may establish such training facilities in collaboration with machinery manufacturers / suppliers.
- There are some Textiles Engineering colleges which have infrastructure for training in the Spinning sector. They may upgrade and expand their training capacity.

7.1.3 HRD PROPOSALS FOR WEAVING

It is expected that around 1.4 lakh modern looms (Semi-auto, Auto and S/L) would be installed in the next 5 years with the expected investment of Rs.30000 crores. The details of manpower requirement and the training targets in modern weaving in the next 5 years period are given in the following tables.

Table-7.4**Expected Man Power Requirement in Weaving Sector for next 5 years
(2006-07 to 2010-11)**

S. No.	Category	Man Power Requirement for additional Looms for Next 5 Years					
		Regions -->	Norms (Operatives /Loom)	South	North	East	West
	Investment % -->		28%	10%	2%	60%	100%
	Looms		23,688	8,460	1,692	50,760	84,600
1	Preparatory	0.10	2314	826	165	4958	8263
2	Operatives Including helpers	1.47	34705	12395	2479	74368	123947
3	Jobbers/Technicians	0.20	4627	1653	331	9916	16526
4	Owners/ Managers	0.10	2314	826	165	4958	8263
	Total		43960	15700	3140	94200	157000

Around 1.57 lakh Personnel as preparatory manpower, operatives , weaver, Jobbers / technicians and Manager / Owner require to be trained in the next 5 years. It is proposed to train atleast 240 trainers in weaving preparatory, Weaving and Maintenance (Jobbers / Technicians) who will in turn impart training to freshers to take care of the expanding requirement of weavers / Jobbers.

7.1.4 Proposals for Training in Weaving

- Training for jobbers (mechanics) especially for most modern shuttle less looms will be a problem as this is not done in PSCs.
 - The machinery suppliers may be compulsorily asked (since they are selling their machinery under TUFS) to train at least 1 jobber per 10 machines. The list of potential jobbers may be supplied by Regional Offices of the Textiles Commissioner. Machinery suppliers may give jobbers training either at their location or at the existing PSCs. The foreign machinery manufacturers will also

have to be dealt separately, to set up / establish training facilities at different locations.

- Standardisation of syllabi and course content for all PSCs, particularly for imparting 2 or 3 months training in most modern looms, is required. Some upgradation of looms at PSCs will have to be done, as no PSC has Water Jet – Air Jet type of looms.
- In view of above intervention the existing training capacity will be sufficient to take care of the expanding requirement of weavers. No addition of PSC is suggested.

7.1.5 HRD PROPOSALS FOR KNITTING

The total investment in the knitting sector during the next 5 years would be Rs. 10,000 Crore. It is expected that around 30,000 knitting machines would be installed in the next 5 years. It is presumed that 30% will be on account of replacement of old knitting machines, and the remaining 70% will be new capacity. The total investment on plant and machinery would be approximately 6,000 Crore (at the rate of Rs.20 lakh per machine).

The details of expected manpower requirement and HRD training requirement in knitting sector in the next 5 years are given in the following tables.

Table-7.5

**Expected Man Power Requirement in Knitting Sector for next 5 years
(2006-07 to 2010-11)**

Sr .No	Category	Man power Requirement for Additional Capacity for Next 5 years					
		Norms (Crores)	South 4000	North 4500	East 1000	West 500	Total
	Regions Investment	(%)	40%	45%	10%	5%	100%
	Investments	(@Rs.20 Lakhs)	12000	13500	3000	1500	30000
	Knitting M/Cs 60% on (P&M)	New Capacity	8400	9450	2100	1050	21000
	Knitting M/Cs (70%) 30% Assumed as Replacement						
1	Preparatory	3.91	32850	36950	4110	8220	82130
2	Operative including Helpers	0.23	1932	2173	483	242	4830

3	Jobbers/ Technicians	0.12	1008	1134	252	126	2520
4	Owners/ Managers	0.12	1008	1134	252	126	2520
	Total		36798	41391	5097	8714	92000

92000 persons are required to be trained as operatives, Helpers, Jobbers / technicians and manager in knitting sector in the next 5 years to meet the HRD needs of 30,000 new knitting machines in knitting sector. The existing private institutions and machinery manufacturers / suppliers would take care of Training needs.

7.1.6 HRD PROPOSALS FOR PROCESSING

The activity of Textiles processing plays an important role in [the](#) marketing of textiles and clothing. It presents the [textiles products](#) in an aesthetic and presentable form, suitable for marketing. It imparts functional properties to the textiles products. It increases the value of Textiles products multi-fold (30-120% from fibres/yarn to fabric) especially in respect of specially finished Textiles goods, enabling high value realisation on domestic as well as on export front. A negligible quantity of textiles goods are sold to consumers in the grey form. It is either desized, scoured, bleached, dyed, printed or functionally finished. In other words, 95% of the Textiles goods are processed in some form or the other.

Structure of the Textiles Processing Sector

Independent Processing units are segmented into Hand Processing units and Independent Power Processing units, depending on their process technology and use of power. There are about 10500 hand processing units, and 2510 independent power processing units in the country. Though some of the hand processing units are operated by Power / electric motors, they continue to be classified as hand processing units. The independent power processing units are further segmented into SSI and Non-SSI units.

Table-7.6

Composition and Technology Level of Power Processing Units is as under:

Composite Units	59
Semi Composite units	167
Independent processing units	<u>2284</u>
Total	<u>2510</u>
Employment (Direct)	
SSI	54449
Non-SSI	121718
Annual Turnover	449874MnSq.Meters
No.of units of modern technology	227
No.of units of medium technology	1775
No.of unit with obsolete technology	322

Table-7.7

**Expected Man Power Requirement in Processing Sector for next 5 years
(2006-07 to 2010-11)**

Sr.No	Category	Man power Requirement for Additional Capacity for Next 5 years					
		Norms (% of total Man Power)	South	North	East	West	Total
	Regions						
	Investments	(%)	20%	10%	5%	65%	100%
	Investment	(Rs.Cr.)	6000	3000	1500	19500	30000
1	Preparatory	30%	9600	4800	2400	31200	48000
2	Dyeing	20%	6400	3200	1600	20800	32000
3	Printing & Fixing	20%	6400	3200	1600	20800	32000
4	Finishing	30%	9600	4800	2400	31200	48000
5	Jobbers / Technicians		1000	500	250	3250	5000
6	Owners / Managers		2000	1000	500	6500	10000
	Total		35000	17500	8750	113750	175000

Training Requirements in Processing

Processing is one of the most neglected areas in the entire value chain, and one of the weakest areas in India in Textiles Manufacturing. Hence, high quality processed fabric is largely imported. Manufacturers also export a substantial quantity of grey unfinished fabric. Hence, for value addition, we need to tackle both high end processing and low-end processing

High-end Processing

There is no institute providing training for masters / technicians who would go on to work on machines bought with the likely investment of Rs.30,000 crore in the processing sector in the next 5 years. As in weaving and spinning, the machinery suppliers in the processing sector (taking benefit under TUFS) may be asked to compulsorily train potential workers. It is strongly recommended that, initially, 2 training centres for textiles processing must be set up with substantial Government support. The likely cost of setting up a centre is Rs.15 - 20 crore towards capital cost for each Centre, and Rs.1-2 crore towards recurring expenditure. They can be started in an existing institution also like, MANTRA / SASMIRA and SITRA. Government may consider giving 50% of the capital cost to set up such an institute, and part of the recurring cost, to be tapered out in 3 years. The likely location – one in Western India (Surat – Ahmedabad – Mumbai area), and another in South (Tirupur – Erode area). Both these areas are major processing clusters.

Low-end Processing

1. SSI power processing (approx. 30,000 m / day per unit).
 - major clusters – Mumbai, Surat, Ahmedabad, Ludhiana, Amritsar, Tirupur with 1851 units.
 - 3 weeks compact training program on important aspects of; operation of machines; dyeing; printing; finishing and its preparatory processes will be required for at least 10 workers from each unit.
 - 6 Institutes (Polytechnic / ITI / TRA / PSC) can start training in 6 different clusters. One-time lab equipment grant of Rs.15-20 lakh / institute may be provided.
 - Initially the trainers should be outsourced and their salaries at the rate of Rs.15,000/- per month may be paid by Government. The cost per year for trainers would be Rs.15-20 lakh only, and Rs.10 lakh for consumables.

2. Hand processing

- 6 major clusters – Jetpur, Pali, Balotra, Jodhpur, Jaipur and Erode – around 1800 bigger units.
- Parliamentary Standing Committee on Labour (14th Lok Sabha) also emphasized on training needs for hand processing units.
- Requirement is to train at least 2 ‘masters’ per unit, i.e., 3600 persons.
- Training requirement (scientific knowledge of dyes and chemicals, processes and preparation of colours and paste, how to improve their existing techniques) is for at least 2 weeks. Outsourcing of trainers @ Rs.15,000/- per month per year which would cost Rs.12-15 lakh for trainers, and Rs.10 lakh for equipment.
- A regular certificate course of 6 months may be started in two ITIs. One time grant would be Rs.15-20 lakh, and recurring Rs.6 lakh per ITI per year.

7.1.7 HRD PROPOSALS FOR GARMENTING

It is expected that around 18.75 lakh new machines would be installed in the next 5 years, out of which it is presumed that 40% will be on account of the replacement of old machines, and the remaining 60% will be on account of new capacity created. The total investment in the Garment sector during the next 5 years would be Rs. 25,000 Crore.

The details of the expected manpower requirement and HRD training requirement in the Garmenting sector in the next 5 years are given in the following tables.

Table-7.8
Expected Man Power Requirement in Garment Sector for next 5 years
(2006-07 to 2010-11)

Sr .No	Category	Man Power Requirement for Additional capacity for next 5 year (in lakhs)					
		Norms (operatives M/C's)	South	North	East	West	Total
	Investments (%)		45%	40%	5%	10%	100%
	Sewing Machines in Lakhs		5.06	4.50	0.56	1.13	11.25
1	Operatives	3.48	17.60	15.65	1.96	3.91	39.12
2	Jobbers	0.03	0.18	0.16	0.02	0.04	0.39
3	Pattern Makers	0.02	0.09	0.08	0.01	0.02	0.20
4	Technicians / Quality Controller	0.02	0.09	0.08	0.01	0.02	0.20
5	Owners / Managers	0.01	0.04	0.04	0.00	0.01	0.10
	Total		18.00	16.00	2.00	4.00	40.00

Existing Institutions for Training in Garment Sector

- The training gap is **widest** in this area.
- ATDCs [total number – 14 presently [3 in the pipeline, and 16 under planning], are training about 12-15000 people, per annum. Some private institutions are also active in this area.
- ITIs across the country are training workers in the garment sector (around 20000-30000) – This is often in old technology & pedagogy. This does not meet the needs of the industry. Also, industry is not aware of where these people are trained.
- NIFT is giving technical advice/support to various State Governments to update syllabi, training, curricula, etc. NIFT also conducts training for trainees.

Proposals for Training in the Garment Sector

- Looking to the huge gap, training facilities must be created/updated in both the Government and Private sector.
- Funding may be on the Gujarat pattern.

- The Government of Gujarat gives assistance of upto Rs.2 crore to set up an apparel training centre to Government & Semi-Government institutions. For the private sector, a grant of 50 lakh or 50% (whichever is lower) is given. This pattern may be adopted by the Government of India also.
- There is an urgent need to:
 - i) Atleast triple the number to 70-80000 per annum.
 - ii) Standardise the course content to suit the needs of the industry.
 - iii) Improve the equipment/machinery with the latest standards.
 - iv) Training the trainers –as of now the technological status is about 15 years old.
 - v) Make the industry aware of the trainees coming out of these institutes.

 - Similarly, Polytechnics, Home Science colleges are also coming out with Textiles (especially garment) trainees say about 4000-5000 per year. The same issues apply here to improve their acceptability by the industry.

 - Private sector training institutes should also be given help to upgrade their equipment/course content. Help may take the form of a one time grant of upto 50% of the cost of equipment or 50 lakhs (whichever is lower)

7.1.8 Other Important Issues in Garmenting Training:

- Where to set up these training Institutes:

It is felt that in addition to setting up training institutes in apparel clusters, they should also be set up in labour-“catchment” areas like Bihar, Orissa, Eastern UP (as expressed by Secretary General, Apparel Export Promotion Council and President, Clothing Manufacturers Association of India). Accordingly, selected ITIs/private institutions in these areas may be particularly considered for this.

There is a strong need for coordination for the creation of training capacity in the garmenting sector which cannot only be addressed by ramping up capacities of the Apparel Training & Design Centres (ATDCs) or the ITI s. A new approach will have to

be taken in co-ordination with both the Ministries of Labour and other Ministries that have provisions for assisting and aiding implementation programmes for the rural and urban poor. In this, organizations like the Infrastructure Leasing & Financial Services (ILFS) & Industrial and Infrastructure Development Finance Company Ltd (IIDFC), who have a multi-sectoral approach to the development of infrastructure, can be used to set up training and educational facilities in the “catchment areas” referred to in this report. They should be permitted to access funds from the Ministries of Rural Development, Urban Welfare and the Ministry of Labour, under self-employment programmes being run by these Ministries.

- Training of Trainers

Most ITIs and even ATDC suffer in terms of both quality and quantity of trainers. The training skills of most ITI trainers are out of date by about 10-15 years. A refresher course of 2-3 months, which acquaints them with the latest equipment/techniques should be compulsory. It is proposed to train these trainers so that they can in turn train approximately 40 lakh workers during the next 5 year period, besides the training by ATDC, NIFT, ITIs and Home Science Colleges. It can be done in select TRAs/NIFT. .

- Constant Inspection/Supervision of Training Institutions:

It is felt that to maintain high standards of garment training, constant & compulsory inspection/supervision is a must.

Training institutions can be categorised in different grades (I, II, III etc.) on the basis of these inspections. This gradation may be publicized and future grants should only be on the basis of these grades.

Inspection Supervision can be carried out by NIFT, which is an autonomous body.

7.1.9 HRD in Woollen sector

- The woollen industry in India is small & scattered. India is the 11th largest producer of wool in the world. The anticipated annual production of indigenous raw wool is 55.10 million Kg (Approximately 1.8 % of the world). It is mainly located in the states of Punjab, Haryana, Rajasthan, Uttar Pradesh, Maharashtra &

Gujarat. Punjab accounts for 40% of the Woollen manufacturing units, whereas Haryana has 27 %, and Rajasthan 10 %. The remaining States account the approximately 23 %. The woollen industry is a rural, export – oriented industry. The organised sector comprises composite units, combing units, worsted & non-worsted spinning units, machine made carpet manufacturing units. The decentralised units include those producing hosiery & knitting, powerlooms, hand knotted carpets, druggets, namdahs, and independent dyeing & processing houses.

- The indigenous production of raw wool is about 45 Mn. Kgs, of which 85 percent is of carpet grade, and only 5 percent is apparel grade. The remaining 10 percent is coarse grade.
- The development of the wool & woollen sector depends mainly on the improvement of wool fibre and quality processing of wool.
- Specific orientation towards the woollen manufacturing process should be introduced / strengthened in the 4 year degree course and the diploma courses in the institutions located in the wool producing states like Rajasthan, Punjab, Himachal Pradesh, Jammu and Kashmir, and Karnataka. This should be done by the addition of curriculum relating to wool and woollen textiles. Some of these institutions are collaborating with wool producing countries, and can take up short term courses for the Indian wool and woollen textiles industry. Such an arrangement will equip these institutions with infrastructure and keep them abreast of the latest technology.

7.1.10 Employment in Woollen Sector

The exiting labour employed in woollen sector is as follows

- | | | |
|----------------------------|---|-----------|
| • Organised Sector | - | 12 lakhs |
| • Sheep Breeding & rearing | – | 12 lakhs |
| • Carpet | - | 3.2 lakhs |

Some training on the orientation of the work practice of the labour employed in the above sector should be imported by setting up training facilities in the Powerloom Service Centres located at the wool manufacturing clusters.

CHAPTER- VIII

8.0 DELIBERATION WITH INDUSTRY AND INSTITUTIONS

The 2nd HRD Committee constituted by the Ministry discussed the various issues relating to HRD needs of the Textiles Industry vis-à-vis various course contents, curriculum, syllabus and existing training facilities etc., among its members, in its meeting held in IIT, New Delhi on 26.05.2006. The Sub-Committee had detailed deliberations with the various industry representatives and principals / representatives of some of the related Institutions (including ITIs), in a seminar organised at IIT, New Delhi on 13.06.2006. The HRD managers, executives, managers incharge of production in the various sectors of the Textiles Industry actively participated in the deliberations. The outcome of the deliberations confirmed the following:

1. There is an acute shortage of operatives and fitters / jobbers for the modern machinery particularly in the weaving and garment sector.
2. Spinning mills have by and large, have their own training facilities for un-skilled and semi-skilled workers. However, for skilled labour and fitters there is a need of institutional training.
3. No formal / institutional training facilities are available for the operatives / jobbers / fitters in the processing sector.
4. At ITI level training in Textiles be imparted in all fields of activity such as weaving, stitching, knitting, printing and dyeing, etc., to meet the shortage of operatives / fitters etc.
5. Some states such as Himachal Pradesh & Madhya Pradesh stipulate by law the employment of locals, upto the extent of 60-70%. Therefore, in such States, training has to be organised locally. The State Government has to come forward to contribute significantly in terms of equity, finance, lands, and buildings for the establishment of appropriate training facilities in the State, in collaboration with Government of India, Ministry of Textiles.

6. Training facilities be provided in all the identified textiles clusters. These training facilities can be created in the private sector institutions, and Powerloom Service Centres by providing grants for the machinery, equipments, infrastructure and regular financial assistance to hire guest faculty / tutors / trainers. The TRA's and PSCs can play an effective role in providing training facilities / infrastructure in collaboration with manufacturers of textiles machinery and cluster level institutions, with the financial grants/ assistance from the Government of India, and / or respective State Government. In such arrangement the involvement of machinery manufacturers is important. They can install cut model machinery and depute their trainers to the PSC's to conduct regular training programmes. This exercise should be done at their cost.

7. Some machinery manufacturers have training facilities, and their charges / fees are, at times, expensive. Besides, such training facilities are very limited leaving a wide gap between the training capacity and the training need of the industry. They should be persuaded to lower these fees.

8. Some Tax benefit (on the lines provided to the R & D Sectors / establishment / centre) be given to industry to promote training culture in Industry.

9. Design / knowledge of Computers / IT and knowledge of human behaviours / personality development and labour laws etc., should be part of curriculum for the Diploma / Degree or PG courses. Exposure to Industry and the shop-floor should form an input experience throughout the course for the Diploma / Degree and PG level. Specific programmes should be included in the course so that students understand the needs of the industry, and that the industry can easily absorb the students who have been thus "broken-in" for the job.

10. Industry and institutes should have leadership training programme for persons required to play a supervisory level role.

11. Though most of the large garment units / industry have their own arrangement for the training of operatives, these are not up to the desired level of standard in many cases. There is shortage of training capacity for supervisory staff.

12. The persons employed in middle management level in Textiles industry need to undergo an orientation training programme at least once in 3 years. This can be looked after by TRAs and textiles institutions.

13. Product development should be part of textiles curricula.

14. Institutions should adopt some local industry for continuous interaction. The industry should also closely interact with institutions.

15. Textiles Institutions have moderate infrastructure which has to be upgraded.

16. It is felt necessary to have a system of periodical training for the faculty of ITIs and diploma / degree/ PG colleges, to update their technical as well as industrial knowledge, which would in turn benefit to the students.

17. There should be minimum 6 months training programmes for B.Sc. or B.A. and other non-Textiles graduate students, who are employed / being employed in the textiles industry to train them for specific jobs such as dyeing, printing, post spinning, post weaving etc. Such training can be taken care of by PSCs, by establishing proper infrastructure, facilities and installing a regular funding arrangement to hire experts / faculty by the training organisation.

18. Industrial training is an important component of the curriculum of professional Institutions. Industry must work together with institutions to work out a strategy which is beneficial for both. In this, the role of faculty and training in charges in industry is important.

19. Continuing education is an important component of training and be given due importance in all training organisations.

20. The CITI (Confederation of Indian Textiles Industry) should play an important role in co-ordinating with institutions and industry for fulfilment of the training needs of various sectors of Textiles industry.

21. The PSCs and the machinery manufacturers may set up joint training centres. The PSCs may provide the space and machinery can be provided by the machinery manufacturers.

22. There is need to upgrade laboratory, library and other infrastructure facilities in most of the Government run institutes. A large number of textiles polytechnics and private institutes have been established, particularly in Tamil Nadu and Karnataka. Most of these private institutes need to upgrade these facilities, and they have adequate space on their premises.

CHAPTER IX

FINDINGS AND RECOMMENDATIONS

9.0 Findings

1. There are about 250 major and minor Textiles Institutes in the Country in Govt./Private Sectors, teaching degree, diploma, post graduation in Textiles and Garmenting. The yearly in-take is approximately 5000 students at various levels. Besides, there are 118 training bodies in the country, like TRAs, PSCs, ATDCs, etc.

2. There are 4971 Industrial Training Institutes (ITIs) spread throughout the country. However, only 1243 ITIs offer training in textiles & garmenting, with a yearly intake of 33372. These ITIs do not provide training in hard-core textiles technology, but have good infrastructure for training of maintenance staff for textiles and garmenting.

3. The intake of students in Textiles Institutes is rather limited, and incremental infrastructure may be required to enhance their capacity to cope with the massive requirement of manpower for the textiles industry.

4. Training need-gaps have been identified in Garmenting, Weaving, Spinning, Knitting, new emerging technologies, modern machinery, I.T. Solutions, quality management, laboratory testing, entrepreneurship, environment obligations, training of trainers, etc.

5. There are 44 PSCs spread throughout the country. The intake capacity of trainees is restricted due to the limited infrastructure available with them. These PSCs can play a very important role in training due to their proximity to the clusters in the decentralised powerlooms sector, close interaction with the industry, and linkage to their parent bodies, like TRA's.

6. These PSCs have potential to provide training in the garment sector also.
7. There are 24 WSCs and 6 handloom institutes dealing only with handlooms technology training. They have the potential to venture into training for powerlooms and garmenting also.
8. TRAs conduct need based training programmes for the industry. The intake of trainees is limited. If their infrastructure and training facilities are strengthened, they can play an important role in training. They can also be used for the training of trainees.
9. Only one TRA, viz., SASMIRA, conducts institutional training for about 1000 students/year. Other TRAs, too, have such potential.
10. Currently, existing institutes like SVPITM offer a Textiles Management course, and can conduct only two or three programmes simultaneously because of their limited faculty and infrastructure facilities.
11. While there are a large number of institutes for supervisory and middle management employment, vocational training for workers in pre- or post-employment stages has not developed significantly in a structured and regular fashion. The Indian textiles workforce has generally developed within the industry, where newly inducted unskilled workers acquire their skills from their skilled colleagues engaged in the industry.
12. The manpower requirement, as observed, will be 5.75 lakhs in Spinning, 1.57 lakhs in Weaving, 92 thousand in Knitting, 1.76 lakhs in Processing and 40 lakhs in Garmenting, thereby throwing up the need to train approximately 5 million workers.

13. The existing workforce in various sectors of Textiles Industry, in the category of skilled helpers, fitters, operatives, technicians / jobbers, supervisors and production incharge, is also required to be trained to cope with the operation, maintenance and production pattern of the modern / technologically upgraded machinery / units. This underlines the need for a relook / review / modification of the existing curricula, syllabi, facilities and capacity available..
14. In the Spinning sector, the present training capacity of TRAs, SIMA, Spinning mills (in-plant training) is about 15000 per year. The expected manpower requirement to operate 15 million additional spindles during the next 5 years will be approximately 5.75 lakhs.
15. In the Weaving sector, it is expected that over 100000 new modern looms will be installed throughout the country in the next 5 years period, and the expected investment would be around Rs.30,000 Crore.
16. Approximately 1.57 lakhs workers will be needed as preparatory manpower, and operatives, weavers, jobbers / technicians, will be required to be trained in the next 5 years. It will be necessary to also train at least 240 trainers who will impart training to trainees to take care of the expanding requirement of Weavers / Jobbers.
17. In the Processing sector, there are approximately 10,500 hand-processing units, and 2510 independent power processing units in the country. Though some hand processing units are being operated by power / electric motors, they continue to be classified as hand processing units. Major power processing (approx. 30,000 m/day/unit) clusters are in Mumbai, Surat, Ahmedabad, Ludhiana, Amritsar, Tirupur. There are 1851 power processing units situated in these areas. Hand processing units are clustered in and around Jetpur, Pali, Balotra, Jodhpur, Jaipur and Erode, with around 1800 bigger units. This sector provides employment to about 1.76 lakh workers.

18. The Processing sector is one of the weakest areas in the Indian textiles scenario. Training needs for both lower- and higher-end processing will have to be addressed.
19. In the Garmenting sector, it is estimated that about 18.75 lakh new machines will be installed in the next 5 years. Of these, 40% will be on account of the replacement of old machines, and the remaining 60% will be new. The total investment in the garment sector during this period is estimated to be Rs.25,000 crores.
20. The training need-gap in the Garmenting Sector will be massive, and the widest amongst all sectors. A workforce of approximately 4 million will be required to be trained in the next 4 - 5 years. Not only will the capacity of existing institutes' like NIFT, ATDCs, ITIs, etc., have to be multiplied for the training of tailors, operatives, cutters, pattern makers, maintenance staff, etc., but a large number of private training institutes will also have to come up throughout the country. Their infrastructure, training facilities, etc., would require to be examined and strengthened.
21. The Woollen Sector consists of composite mills and decentralised units. The activities of composite mills include combing, worsted, woollen spinning, machine made carpet manufacturing. The decentralised sector comprises of Hosiery and Knitting, powerlooms, hand knotted carpets, dyeing and processing, etc. There is no Textiles Institute which conducts regular and structured training and education exclusively for the woollen sector.

9.1 Recommendations

- Government may consider the allocation of least Rs.100 crore per annum for HRD in the Textiles and Clothing industry.
- All parks coming under the scheme for Integrated Textiles Parks may be asked to compulsorily earmark 5% of the Government grant to set up HRD & training

facilities. They should run regular self-sustained HRD and training modules suitable to that park and its neighbouring area.

- An advertisement budget should be set aside to create awareness of these training programmes and their immense job potential. As of now, awareness is very low. For example, the Apparel Export Promotion Council and members of the Clothing Manufacturers Association of India of Mumbai were not aware of the existence of an apparel training course in the State Government Girls ITI and Regional Vocational Training Institute for Women in Dadar (Mumbai), itself. Similarly, potential trainees are not aware of the immense job opportunities in the textiles and clothing sector.
- The Processing sector has been neglected with regard to the HRD and training aspects by the industry and most institutions. Hence, immediate intervention by the Government in the HRD and training inputs in the processing sector is imperative. HRD intervention in both high and low-end processing can be successfully accompanied with minimum investment. Any further neglect will hamper India's edge in the globalised competitive scenario. Presently, this sector has the greatest potential for value addition to Indian textiles and clothing. Major Government intervention is required to create HRD and training infrastructure in the garment and apparel sector. Infrastructure in the area of Garmenting may also be created in the existing PSCs. This sector has the maximum job potential. The per-capita cost of training in the garment sector is very low.

9.1.1 Need to Create A Permanent Training Coordination-Cum- Monitoring Body

- As is well known, the value chain in the textiles sector is highly disaggregated. No single Organization or Body monitors or coordinates HRD and training across various sectors of the Textiles Industry. With increased globalisation and immensely expanding employment opportunities, and the consequent emphasis on skill-development, there is now a need for a centralised Body to coordinate & monitor these activities.

- It is important that the Ministry of Textiles invest a substantial sum annually to upgrade textiles and clothing training. Hence, the need arises to see that the money allocated by Government for HRD and training development for the industry is well spent. There should be a permanent coordinating-cum-monitoring Body which can also source funds for the textiles sector from other Ministries like Labour & Employment, Rural Development, as also State Governments.
- This Body would be in a position to channel skilled personnel in the respective manufacturing sectors in the textiles industry through institution-industry linkages.
- This Body will have the greater role to also meet the challenge to constantly develop course content in the textiles and garment sectors, and also suitably modify this, according to the needs of the industry.

9.1.2 Creation of New Group in the Office of the Textiles Commissioner

- A new wing can be created in Office of the Textiles Commissioner to service this coordination-cum-monitoring Body (without any new recruitment).
- The Body can be headed by Secretary (Textiles) and include
 1. Textiles Commissioner.
 2. Joint Secretary, Ministry of Textiles.
 3. Two or more selected Textiles Institutes, Government & Private from different geographical regions.
 4. Directorate General of Employment & Training, Ministry of Labour.
 5. Two or more Textiles Research Associations (TRAs).
 6. D.G., NIFT.
 7. Secretary General, AEPC (for ATDCs).
 8. Representatives of the State Governments (Technical Education).
 9. Jute Commissioner.
 10. A representative of the Machinery Manufacturing Association.
 11. A representative from Textiles Industry Associations.

9.1.3 Proposed interventions in higher education for the textiles sector

- Presently, there does not seem to be an immediate problem about the quantity of output. In any case, private institutions will increase intake, depending on demand.
- Nevertheless, a strong need has been expressed by the industry to standardise and update the curricula of training and educational institutions in the textiles sector.

9.1.4 Proposed interventions for ITIs

- There is a pressing need to increase the number of trades relating to the textiles sector.
- The number of ITIs targeted specifically at the textiles sector needs to be increased exponentially.
- It is important that a larger number of ITIs are identified to introduce textiles related trades.
- The Centres of Excellence (COE) scheme should be leveraged to increase the number of those ITIs that are either specifically targeted at the textiles sector, or those that include a substantial number of textiles related trades in their curriculum.
- ITIs situated near “catchment” areas for the textiles work force should immediately include textiles related trades in their regimen. If necessary, new ITIs should be set-up in those areas where, traditionally, workers migrate to places where the textiles industry is located. New ITIs under the COE scheme will have drawing power for these workers.

9.1.5 Intervention for Upgradation of Laboratories and Libraries at the Institute level

- Laboratories and libraries at the Institute level, etc., will require systematic upgradation.
 - Selected Institutions should be given financial assistance over a 5 year period to modernise their laboratories and libraries.
- There is also a need to facilitate a dialogue between Science and Home Science Colleges and the industry.

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LIST OF ABBREVIATIONS

AICTE	-	All India Council of Technical Education
ATDC	-	Apparel Training & Design Centre
ATIRA	-	Ahmedabad Textile Industries Research Association
CAD	-	Computer Aided Design
CAM	-	Computer Aided Manufacturing
CITI	-	Confederation of Indian Textile Industry
COE	-	Centre of Excellence
CRISIL	-	Credit Rating Information Service of India Ltd.
DGE&T	-	Directorate General of Employment & Training
GOI	-	Government of India
HRD	-	Human Resource Development
IICT	-	Indian Institute of Carpet Technology
IIHT	-	Indian Institute of Handloom Technology
IIT	-	Indian Institute of Technology
IT	-	Information Technology
ITI	-	Industrial Training Institute
MANTRA	-	Manmade Textile Research Association
NCUTE	-	Nodal Centre for Up gradation of Textile Education
NCVT	-	National Council of Vocational Training
NIFT	-	National Institute of Fashion Technology
PG	-	Post-Graduate
PSC	-	Powerloom Service Centre
S/L	-	Shuttle less
SASMIRA	-	The Synthetic & Art Silk Mills' Research Association
SIMA	-	Southern India Mills' Association
SITRA	-	The South India Textile Research Association
SSI	-	Small Scale Industries
SVPITM	-	Sardar Vallabhbhai Patel Institute of Textile Management
TRA	-	Textile Research Association
TUFS	-	Technology Upgradatin Fund Scheme
WSC	-	Weavers' Service Centre

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CHAPTER – I

Introduction

1.0 Introduction

Concern is often expressed that the process of growth in recent years has not generated employment at the pace required for additional entrants to the labour force. However, in the Textiles sector, the end of textiles import quota regime in the industrial countries offers India a huge opportunity to expand textiles and garment exports and thus generate substantial employment, provided we can compete with other developing countries, - as observed by the Planning Commission in its Approach Paper for the 11th five year Plan. Besides, the growing number of domestic consumers, with increasing per capita consumption of textiles would call for greater manufacturing activities in the textiles and garment industry, thereby increasing the potential for employment scenario.

N.K. Singh Committee had estimated that by 2010 there will be a total investment of Rs.98,550 crores in Textiles Sector, out of which Rs.37,050 Crores in Processing, Rs.10,600 Crores in spinning, Rs.22,950 crores in weaving, Rs.24,000 crores in Garmenting, Rs.3,150 crores in knitting, Rs.1800 cores in Ginning & Processing, Rs.500 croes in Jute and Rs.1200 crores in Silk & wool. Target for Garments export will be US \$ 25 billion by 2010. Similarly New Textiles Policy 2000 aimed at US \$ 50 billion (Garments US \$ 25 billion) as Textiles Exports Target. According to the N.K. Singh Committee, total employment of 82 million in Textiles Sector in 2002 will be enhanced to 91 million by 2006-07. In a recent study by the Credit Rating Information Service of India Limited ([CRISIL](#)), the textiles sector in India is projected to grow from its present level of approximately US \$ 37 billion to US \$ 85 billion by the year 2010. Domestic consumption is projected to rise to US \$ 45 billion, and exports are targeted at US \$ 40 billion. These estimates will see phenomenal growth in the manufacturing, processing and garmenting sectors of the textiles industry, which in turn will throw up the need for an estimated **12 million new jobs**, of which 5 million will be in the organized sector, and remaining 7 million in

supporting and ancillary services. In order to cope with the enhanced requirement of trained man-power on such a massive scale within a short span, the sector will have to be strengthened and augmented for providing this workforce.

The Planning Commission in its Approach Paper for the 11th Five Year Plan have emphasized the need for the manufacturing industry to attain double digit growth. The constraints identified, among others, is an emerging shortage of high quality skills that are needed for the manufacturing industry, which could erode our competitive advantage. Unless this problem is addressed on an urgent basis, we will fail to attain global standards. Emphasis on the faster growth of manufacturing industry, which is a subset of industry, should be around 12% in the 9% GDP growth scenario. Technological modernisation being the key to high industrial growth, labour intensive industries like textiles, will not only require skilled workforce, but also massive vocational training for skill upgradation of the existing workers engaged in the organised as well as unorganised sectors, (including handlooms, powerlooms, sericulture, wool, khadi, etc.) The Textiles sector has the second largest share of employment after agriculture.

Education and training are the most critical elements in empowering people with skills and knowledge and giving them access to productive employment. The 11th Plan, it is proposed will focus special attention on this area. For vocational training and skill development/upgradation, Industrial Training Institutes (ITIs) are proposed to be revamped to achieve the objective of work force training. Similarly, for higher education, for knowledge development, existing institutions must be strengthened and expanded wherever possible. In fact, the Planning Commission envisaged that the 11th Plan must pay special attention to labour intensive manufacturing sectors like textiles to increase the employment intensity of economic growth.

In order to cope with the massive employment generation in textiles, the Ministry of Textiles decided to constitute this Committee to examine the status of

the existing educational and training infrastructure available in the country, both in the public and the private sector, and explore the directions and opportunity of future growth in the human resource segment of the textiles sector. The Committee was asked to:

- Study the status of existing curricula, capacities, and infrastructure of these institutions and make recommendations for their re-orientation, if necessary;
- Assess the need for human development in the light of this and the above projections; and
- Recommend appropriate curricula, and the development of additional capacities and infrastructure that need to be created, identify appropriate methodology for this purpose, and recommend the agencies in the fulfilment of these objectives.

The composition of the Committee is given in Appendix 'A'.

1.1 Methodology

The Committee decided to form three Sub-Committees to deliberate various issues, as under:

1. **Sub-Committee to study existing institutions**, with the following terms of reference:
 - (a) To analyse the existing textiles education and training facilities vis-à-vis industry's requirements and recommend consolidated roles relevant to the current environment;
 - (b) To recommend infrastructure required and grants for HRD
 - (c) To recommend a mechanism to synergize the operation of all institutions and improve their functioning.

2. **Sub-Committee for upgrading Textiles Education** with the following terms of reference:

- (a) To evaluate the current syllabi of all textiles courses, and interact with the industry and recommend new syllabi at the all-India level;
- (b) To evaluate laboratories, libraries, and other infrastructure facilities and make recommendations;
- (c) To recommend appropriate in-plant training needs for each level.

3. **Sub-Committee for identification of the current training needs of different sectors**, with the following terms of reference:

- (a) To evaluate the existing training infrastructure facilities and recommend ideal training facilities required to meet the current industry requirement;
- (b) To estimate funds required and their allocation
- (c) To identify closed public and co-operative textiles units, and study the feasibility of converting them into Textiles Industry Training Institutes. Ideally, these should be situated where the textiles industry is concentrated.

Accordingly, the Sub-Committees carried out Focussed Group Discussions (FGD), examined presentations of various institutes, held seminars, contacted the Principals and Heads of selected Textiles and Home Science Colleges, etc. Desk-research was extensively carried out, and web sites of various training and educational institutes were also accessed. Besides, questionnaires were sent to over 180 institutes to examine their courses, faculties, yearly in-take, infrastructure facilities, laboratories, workshop, support staff, etc.

CHAPTER – II

Study of Existing Textiles Education & Training

2.0 Analysis of Existing Textiles Education & Training

The history of economic development reveals that the textiles industry was the foundation of growth in most of the industrialised countries. The textiles industry acted as the engine of growth in Asian countries like India, Japan, Korea and other South-East Asian countries. It is the oldest and the largest industry in India, established over hundred years ago. With the establishment of composite mills in Mumbai and Ahmedabad as well other parts of the country and jute industry in Bengal, the need for textiles education and training was felt, and a few textiles institutes were established in the early twentieth century, covering conventional technologies in spinning, weaving, dyeing, etc., to develop a workforce that would man the shop floor. Higher education for Indian technologists was mainly imparted in Manchester, Leeds, Bolton, etc., in U.K.

2.1 Scenario of Textiles Education in India

With the growth of textiles industry as a mammoth industry in course of time, a large number of textiles institutes were founded in all corners of the country teaching mainly conventional technologies. There were structured educational inputs, mainly for supervisory and middle level, at pre-employment stages in all these institutes. There was hardly any institute providing skill-development and upgradation at the operators' level, except that after independence when the Textiles Research Associations were established. Training programmes were conducted at these institutes whenever industry approached them for the skill-upgradation of workers. Industrial Training Institutes (ITIs), established in the 1950s, with steep growth in subsequent decades, hardly provided core-competency training in Textiles at operators' level, unlike other engineering disciplines. Vocational training for workers in the pre-or post-employment stages did not develop significantly in a structured and regular fashion. The Indian textiles workforce was generally developed within the industry where newly inducted unskilled workers acquired their skills from skilled colleagues already engaged in the

industry, who passed on their expertise to such unskilled workers. As a result, they inherited the basic expertise along with any flaws and faulty skills. Some of the progressive composite mills did have training arrangements for unskilled and semiskilled workers as in-plant training. Nevertheless, such on-the-job training was more an exception than general practice.

Since the concept of structured textiles education was mainly centered on the employability of high school or intermediate level students and their ability to acquire qualifications, all the textiles institutes started graduating large numbers of qualified personnel in conventional technologies for the industry. In the process, the syllabi were often outdated, and did not keep pace with the latest developments. There were polytechnic level and undergraduate level courses in these institutes and, gradually, institutes of higher learning like the IITs, and a few others, introduced post graduate and PhD level programmes in the 1960^s.

2.2 Existing Institutes engaged in Textiles Education & Training

As per available information published by Nodal Centre for Upgradation of Textiles Education (NCUTE) (2003), there are 53 polytechnics, 36 graduate, and 14 post-graduate level textiles institutes in the country turning out about 5000 students every year. Internet sources, however, revealed that there are 74 polytechnics and 54 graduate, major or minor, Government and private Institutes in the country. With the development of the garment industry, fashion, merchandising and related courses have acquired critical importance. Now, there are 93 diploma, 20 degree and 5 post-graduate level institutes in garmenting set up in the Government and private sectors. Degree level courses are of 4 years duration, Post-graduate level courses are of 2 years duration, and diploma-level for 3 years after High School or middle level education, as the case may be.

From the published literature of NCUTE, the existing structured textiles institutes (Govt. & Private) are given in Table-1.1.

Table – 1.1

(Textiles Technology / Chemistry / Engineering)

Sr.No.	Education Programme	No. of Institutes			Yearly Intake (Nos.)
		Govt./Aided	Private	Total	
1.	Diploma	32	21	53	3110
2.	Degree	20	16	36	1619
3.	Post-Graduate	14	--	14	225

Source: Textiles Institutes of India, published by NCUTE in 2003

N.B. However, an Internet search has revealed that there are 74 diploma, 54 degree, and 14 P.G. level Government/Government-aided private Institutes in the country, engaged in Textiles Education.

The NCUTE publication (2003) has not given details of the Institutes providing training and education in Garmenting, except that there are 18 institutes in Fashion Technology. From our Internet search, we find that the following number of Institutes are engaged in Garmenting and Fashion Technology:

Table – 1.2

(Fashion Technology / Garmenting)

Sr.No.	Education Programme	No. of Institutes	Yearly Intake (Nos.)
1.	Diploma	93	Information not available
2.	Degree	20	
3.	Post Graduate	5	

2.3 Other Training Institutes

Besides, training facilities are available with the following bodies:

1. Textiles Research Associations (TRAs) : 8
2. Powerloom Service Centres (PSCs) : 44
3. Indian Institutes of Handloom Technology (IIHT) : 4
4. Weaver's Service Centres (WSC) : 24
5. Industrial Training Institutes (ITI) : 4971 (1243 in Textiles)
6. Home Science Colleges offering Textiles & Clothing Courses: 24
7. Apparel Training & Design Centres (ATDCs) : 14

2.3.1 Textiles Research Associations (TRAs):- There are 8 Textiles Research Associations located at Mumbai, Surat, Ahmedabad, Coimbatore, Ghaziabad and Kolkata. Though engaged in R & D, testing, consultancy, etc., each of them provide training programmes to the industrial workforce depending on the requirement of the industry. One TRA has a full-fledged Textiles Institute at diploma level, and other vocational training.

2.3.2 Powerlooms Service Centres (PSCs):- There are 44 PSCs run by the Textiles Commissioner's Office, the TRAs and the State Governments. These PSCs are located in the powerloom clusters spread through out the country. Besides other services, most of the PSCs conduct training programmes for the powerlooms sector. Most of them have adequate infrastructure like pilot plants, laboratories, etc.

2.3.3 Indian Institutes of Handloom Technology (IIHTs):- There are four such institutes located at Varanasi, Salem, Jodhpur and Guwahati. These institutes mainly provide training for the Handlooms Sector at the Diploma level, and also other skill development to handlooms weavers and dyers.

2.3.4 Weaver's Service Centres (WSC):- There are twenty four Weaver's Service Centres spread over the country. They carry out training mainly for the handlooms weavers for skill development in crafts, and design related to traditional textiles.

2.3.5 Industrial Training Institutes (ITI):- The Directorate General of Employment & Training (DGE&T) initiated the Craftsman Training Schemes (CTS) in 1950, by establishing about 50 Industrial Training Institutes (ITI's) to impart skills in various vocational trades to meet the skilled manpower requirements for the technology and industrial growth of the Country. During the 1990's, growth had been steep and, presently, there are 4971 ITIs (1869 Government and 3102 in the private Sector) with an annual capacity of 7.18 lakhs trainees. Unfortunately, hardcore textiles technology is not a part of their training scheme. 1243 ITI's also offer textiles training, with a yearly intake of 33372. Training in these ITIs is mainly given in the following trades:

- (1) Bleaching;
- (2) Dyeing;
- (3) Block printing;
- (4) Cutting and tailoring;
- (5) Dress making;
- (6) Embroidery;
- (7) Hand weaving of niwar tape;
- (8) Durries;
- (9) Carpet;
- (10) Knitting with hand operated machine; and
- (11) Weaving of silk and woollen fabrics, etc.

Such training normally aims at skill development of individuals for self-employment.

In the Constitution of India, vocational training is on the Concurrent List. The development of training schemes at the national level, formulation of policy, deciding of training standards, norms, evaluation, procedure, examinations,

certification, etc., are the responsibility of the Central Government; whereas, the implementation of training schemes largely rests with the State Governments/UT Authorities. The ITIs, both in the Government and Private Sector are considered as established wings for such vocational training.

Though hard core technologies related to textiles are not included in the ITI's schemes of training at present, the following existing vocational training schemes can be exploited for the training of maintenance and engineering staff of the textiles industry on a larger scale:

- (a) Advanced Tool & Die Making
- (b) Advanced Welding
- (c) Advanced Refrigeration & Air Conditioning
- (d) Electrical Maintenance
- (e) Induction to Engineering Technology
- (f) Machine Tools Maintenance
- (g) Micro Computer/Industrial Control
- (h) Process Control Information
- (i) Production Technology
- (j) Tool Design
- (k) Hydraulics & Pneumatics
- (l) CAD/CAM
- (m) CNC & Control Technology
- (n) Maintenance of PCs & Peripherals
- (o) Industrial Automation

ITI's may be persuaded to relate such courses with the inputs from the textiles industry to make them more relevant to modern machineries and maintenance used in textiles industry. The ITI's (1243) which are conducting low-end vocational training, may be strengthened to take up the training of textiles workers for skill development, skill upgradation, retraining, etc.

2.3.6 Home Science Colleges :- Twenty four such colleges offer courses in Textiles & Clothing to women students at graduation and post-graduation level. Such colleges, under various universities, are spread over a dozen States and Union Territories.

2.3.7 Apparel Training & Design Centres (ATDCs) :- These training centres are devoted to garmenting, with skill development programmes for tailoring, cutting, pattern making, maintenance of stitching machines, automated production, designing, etc. The centres are located at various clusters of the garment industry.

2.4 Feed back from Institutes

In order to collect information and feed back on institutional curricula, over 180 Government and Private Institutes engaged in education and training in Textiles and garmenting were approached with a questionnaire which focussed on eliciting information pertaining to:

1. Courses offered at the Post-graduate level
2. Courses offered at the Degree level
3. Courses offered at the Diploma level
4. Courses offered at the Certificate level
5. Vocational/Skill-development training
6. Infrastructure (Class rooms, Laboratories, Workshops, Auditorium, Seminar rooms, Canteen facilities, etc.)
7. Industrial training/Internship
8. Total Strength of Student intake
9. No. of Faculty
10. Support staff
11. Faculty details (qualification, experience etc.)

12. Department-wise details of machinery, equipment, etc.

13. Any other information relevant to education, training, etc.

However, only 11 Government Institutes and 14 private Institutes were forthcoming. A summary of the information received is tabulated at **Annexure-1**.

We can, nevertheless, draw the following surmise:

- i) Institutes in the Government and Private sector, offer courses in Degree or Diploma level education. A few offer courses at the Post-graduate level.
- ii) Institutes offering vocational training do not cover the gamut of the textiles industry
- iii) Intake of students vary from 10 to 60 in general in various courses.
- iv) Semi private Institutes take 100 to 180 students every year at diploma level in a few courses.
- v) Most of them are approved by AICTE/Directorate of Technical Education of the concerned State Government
- vi) Infrastructure available in these Institutes is of reasonable quality, and in certain cases very good.
- vii) Faculty available in these Institutes is of generally of acceptable standards.
- viii) Degree level courses are of 4 years duration, post-graduate 2 years and Diploma 3 to 4 years.
- ix) Vocational courses vary from 1 week to 1 year.
- x) A few Institutes carry out part-time vocational courses.
- xi) Subjects covered are wide and varied.

Though the information collected is not exhaustive, it reflects a general trend in existing textiles education and the training set-up available in the country. NCUTE Publication (2003) also accepted that existing Government and private Institutes have reasonable infrastructure, faculty, laboratories, etc.

A list of academic institutes is given at **Annexure-2**. Information collected from the Ministry of Labour/AICTE is given at **Annexure-3**. A list of other bodies engaged in textiles & garment training is given at **Annexure-4**.

2.5 Industry Requirements in the current environment

We have accepted the CRISIL estimates for manpower for the purpose of this study.

As envisaged, there will be a requirement of a 12 million workforce by 2010, of which 5 million will be in the core-technological areas of production activities in the Textiles and Garment industry, and the remaining 7 million in supporting and auxiliary services. It will be expedient to plan for the requirement of training of this 5 million technology-driven goals manpower.

Ten to fifteen percent of this additional manpower will be required at the supervisory, middle management levels, etc., in the production facilities. Infrastructure for textiles education is adequate in over 200 textiles institutes spread over the country imparting education at diploma, degree and post-graduate levels. It may be necessary to increase the in-take capacity of these institutes by strengthening their infrastructure. Thus, there may not be major problem in coping with the additional requirement of manpower at this level.

However, considering the current environment and industry's requirements, a major problem is envisaged with our ability up to cope with the massive requirement of skilled workforce at operatives level, like spinners, weavers, dyers, finishers, tailors, maintenance staff for machinery etc. The modernisation of textiles mills with state-of-the-art machineries and plant will only underline the training requirement for even the existing operators to upgrade their skills. Unfortunately, the present training and educational infrastructure,

facilities available with textiles institutes are not adequate to train approximately 4 to 4.5 million of trainees.

The scenario that emerges from our estimates requires planning for the training of over 1 million trainees every year. A detailed worksheet giving the training / education requirements for the textiles industry and garment industry is given separately at **Annexure-5**.

To achieve the target, all the training institutions in the Government and the Private sector, and the Powerlooms Service Centres, IITTs, WSCs, TRAs, ATDCs etc., which are already carrying out industrial training, will have to be restructured/re-oriented by enhancing their infrastructure to equip them to provide such massive training infrastructure. Additionally, an equally large, if not larger, infrastructure will have to be created with participation from the textiles industry and trade.

A major step to cope with the task of massive industrial training will be harnessing the strong infrastructure of ITIs spread in all corners of the country. There are about 5000 ITIs in the country already imparting training to over 7 lakh trainees in disciplines, other than core technology for textiles and garmenting. Creating training facilities and infrastructure in these ITIs for operators training for the textiles industry will constitute a major step to solve the problem of the massive training requirements of the textiles industry.

In this context, the emphasis placed in the Approach Paper of the Planning Commission for the 11th Plan on skill development is relevant, and is quoted below:

“The scope for expanding capacity through private sector initiatives in higher learning must also be fully exploited, while also ensuring that quality standards are not diluted. Unless this is done on an urgent basis, we will fail to global standards.

No society, certainly not at India's stage of economic development, can give everyone high-end skills to make them doctors, engineers, software specialists financial analysts or even provide university level education to all. Industry also requires persons skilled in many specific trades and the situation in this area is not comforting. India has historically lagged behind in the area of technical/vocational training and even today enrolment rates in ITIs and other vocational institutes, including nursing and computer training schools, is only about a third of that in higher education. This is quite the opposite of other Asian countries which have outperformed us in labour intensive manufactures. Our ITIs will have to be substantially expanded not only in terms of the persons they train but also in the number of different skills and trades they teach. The quality and range of their training should keep pace with the changing needs of the economy".

CHAPTER – III

HRD Infrastructure Facilities Required

3.0 Infrastructure Facilities Required

With the dismantling of the quota regime from January 2005 the contours of the global textiles trade have changed dramatically. India's comparative advantage has to be leveraged to convert it into competitive advantage by value addition across the entire chain. India's share in global textiles and apparel trade is expected to double to 6% from current 3%. The growth in domestic market will be fuelled by growing Indian economy, growing at a pace of 8%, creating a sharp rise of the consuming class. The entire textiles trade in India has the potential to reach a turnover of US\$ 100 billion by 2010.

The investment in the textiles sector by 2010 (according to the CRISIL study) is expected to be approximately Rs.1400 billion, of which the Spinning sector is to attract Rs.370 billion, the Weaving sector Rs.250 billion, the Knitting sector Rs.30 billion, the Processing sector Rs.500 billion, and the Garment sector Rs.250 billion. The strengths of Indian textiles industry, as identified, are a wide multifibre raw material base, large and expanding production capacity, flexible production systems, abundant labour, an old textiles tradition, a large domestic market, low import intensity and a strong downstream industry. Its weaknesses are low technology input, **lack of skill upgradation and appropriate training**, traditional management, inflexible labour laws, a fragmented industry and inadequate infrastructure. With the mass scale expansion of the textiles industry in the near future, manpower requirements for skilled and semiskilled work forces, as well as supervising and managerial level will assume a significant role and lead to the review and restructuring of the textiles education and training infrastructure in the country.

As stated, it is expected that over 12 million jobs are likely to be created in the textiles industry and related areas. While there is reasonable infrastructure

for structured education and training at the diploma, degree, and post-graduate levels, facilities available for the training of the workforce at the operatives' level in maintenance and skilled jobs require augmentation and strengthening. Out of the 5 million jobs on the production floor, the largest share will be for skilled and semi-skilled labour, for whom there is no worthwhile training infrastructure available in the country. The garments sector is a relatively new addition to the textiles industry. A massive training and education infrastructure will be a pre-requisite to cope with the huge skilled manpower requirement for this sector.

On the whole, the Indian textiles and garment industry is poised for a quantum leap and has to leverage its competitive advantage in the post-quota regime. Entrepreneurs and existing players are expanding capacities and adopting strategies addressed to the growing consuming class. Industry is striving to improve quality, productivity and efficiency. It is introducing global benchmarks with the support of modern technology and IT solutions. The emerging new technologies in weaving, spinning, processing, nonwovens, knitting, etc., require knowledge-based skilled manpower even at the shop floor. The missing links are orientation towards modern technology, retraining, skill up-gradation, managerial skill, entrepreneurship development, etc., based on a skilled workforce in conventional technologies. The growth of the Indian economy at 7-8%, and its focus on the development of infrastructure augur well for the growth of the industry, provided there is a trained workforce available behind modern machines. A pragmatic approach by all stakeholders in formulating sound textiles education and attendant training systems for the various sectors of the industry cannot be overemphasized.

3.1 Training Need-gaps

In order to examine infrastructure requirements, it will be expedient to examine the training need-gaps.

In the global scenario, especially in the context of new trade regimes, the demand for trained manpower, competent to manufacture quality products, with high productivity, and to handle sophisticated machines, has been increasing rapidly in

textiles and garment manufacturing. Many new technologies of production of fibres, yarn, fabric, and other textiles based products have been devised, and are being commercially exploited. Conventional production techniques like ring spinning, weaving looms, etc., have been supplemented, strengthened or supplanted with newer production technologies with high speed and automation. Textiles today are being used in innumerable functional applications, governed by rigid specifications as part and parcel of material science. New emerging technologies have been introduced in the form of technical textiles, phase changed material, smart textiles, etc. The introduction of CAD/CAM, IT solutions, technical textiles, etc., have led to training need-gaps for textiles technologists and operators, who will have to re-orient their knowledge and expertise in newer areas. Besides, technologists and entrepreneurs require to be retrained not only in their technical and managerial disciplines, but also in merchandizing, quality management, evaluation and laboratory management, interpretation and use of data, I.T. solutions, environmental and social obligations, etc. Training gaps in the decentralised sector, which produces more than 95% of the textiles products require appropriate training inputs for workers, supervisors, middle-management and entrepreneurs. Training need-gaps for the decentralised sector have to be tackled differently in comparison to the organised sector. Garmenting and Fashion technology are relatively new in the Indian textiles scenario. These sectors have substantial potential for the industry, both in terms of export and domestic consumption. Being labour intensive, these sectors will require focussed training for skill-development and skill-upgradation. Training and retraining in these areas will be a wise investment in our human resources, to exploit the full potential of the textiles and garment industry.

Training need-gaps are required to be identified in the following areas:

1. Conventional Sectors like ginning, spinning, weaving, dyeing & processing
2. Garmenting
3. Fashion Designing
4. TUFS related machineries
5. Knitting
6. Nonwovens

7. New emerging technologies
8. Technical textiles
9. I.T. solutions in textiles
10. Maintenance of machinery
11. Powerloom Sector
12. Woollen Sector
13. Silk Sector
14. Jute Sector
15. Handlooms Sector
16. Quality Management & productivity
17. Lab. Testing/evaluation and Lab. Management
18. Entrepreneurship Development in Textiles
19. Textiles Management
20. Environment obligation
21. Work-practices and Communication skills
22. Trade Unionism and Labour laws
23. Training skills for Trainers

In each of these areas, it will be important to study and assess the need-gaps in skill and expertise, right from the operator's level to the top management level. After assessing the micro-level training need-gaps, the training module, course content, training programmes, etc., will have to be formulated and implemented.

3.2 Appropriate Training Infrastructure

After identifying the training need-gaps, an appropriate training infrastructure will be required to be decided at different levels for workers, supervisors, middle management, and top management in the various sectors of textiles industry. The following training modes may be considered in this context:

1. On-the-job training
2. Institutional training
3. Structured training
4. Industry-Institute linkage
5. Training of trainers

6. Training abroad in selected areas
7. Focussed Group training in the decentralised Sector.

In this regard, following infrastructure for training is important:

3.2.1 Operator's training

Since operators comprise the major component of the workforce (more than 60% in the textiles industry and 80% in the garment industry), an 'on-the-job' training mode can be adopted by establishing a training line/division in the factories with knowledgeable trainers from among the skilled employees, or with the help of outside training consultants. In the case of a cluster of factories in a particular area, such training can be conducted by drawing up a common programme. Since the common objective is to derive benefit, a group of factories under different managements can club together their facilities and resources to bridge the skill-gap of their employees. This training mode will be economical and specifically useful for the decentralised sector and the garment industry.

3.2.2 Maintenance staff

There are facilities available in a large number of ITI's, spread throughout the country, to train maintenance staff that can service the manufacturing sector, including the Textiles Industry, in the mechanical, electrical and electronic disciplines. Such facilities should be harnessed to train maintenance staff.

3.2.3 Institutional Training

Institutional and structured training modes can be practiced in over 200 polytechnics and graduate level institutes, which are geographically distributed through out the country. This can take care of the training needs of the local industry. The aim should be focussed more on skill-development and skill-upgradation required instantly for the industry, rather than elaborate theoretical inputs.

3.2.4 Training with Industry-Institute Linkage

A strong Industry-Institute linkage in the training mode has significant potential to tackle training need-gaps. It has been observed that students passing out from the

Institutes require considerable time to be actually relevant and useful to the needs of the industry. There is a lacuna in practical training in these institutes, a hiatus between the teaching in the Institutes and the need and expectations of the industry, particularly for the shop floor level. An Institute-Industry linkage and practice of purposeful and relevant internship should go a long way to bridge the training need-gaps.

3.2.5 Training of Trainers

Textiles and garment industry is geographically distributed at various centres throughout the length and width of the country. Training centres also will have to be located accordingly. In order to standardize training inputs and curriculum, it will be necessary that a core group of trainers are trained from across the country. These will comprise the training resource personnel. There will be need to train such trainers, and a training mode of 'training the trainers' will have to be devised. This core group will eventually train local trainers.

3.2.6 Training in Emerging Technologies

For new emerging technologies like Smart Textiles, Plasma technology, Phase changed Material, Technical Textiles, IT based hi-tech machinery, frontier technologies, etc., it will be necessary to train our technologists and scientists by sending them abroad, because such facilities may not be available in the country.

3.2.7 Training for the Decentralised Powerlooms sector

The decentralised powerlooms sector has grown in an unplanned manner, but the fact is that today our textiles production depends largely on this sector. An appropriate training mode has to be devised to make this sector technically competent, and to enhance its productivity and quality. This sector is manned by an unorganised labour force, which requires intensive training in the fields of machinery operation and maintenance, quality and productivity, etc. The units are fragmented and loaded mostly with outdated machinery and technology. The entrepreneurs are also from the weaker strata of society and lack managerial skills of the desired level. Since this sector, along with the handlooms and hosiery sectors, accounts for more than 95% of basic textiles output, a meaningful and effective training infrastructure will be imperative.

3.3 Frame-work for training

The frame-work for training will have to be devised in the following areas:

3.3.1 Workers

- Structured training for unskilled workers in the pre-employment stage
- Periodic skill-upgradation of workers (Semiskilled and skilled) in the industry with short-term duration for re-orientation.
- Skill-development on new machines in any sector of the industry (by the machinery suppliers)

3.3.2 On-the-job-training

- Operator level
- Supervisory level
- Middle management level
- Executive level

3.3.3 Institutional Training

- Academic
- Technological
- Management
- Quality Management
- IT Solutions
- New emerging technologies.

The institutional training curriculum should be dynamic and the course content must be reviewed periodically to include the latest technology adopted by the industry from time to time. Technical and practical contents should be matched in such a way that the utility and efficacy of the trainees coincides with their deployment.

3.4 Training Infrastructure Requirement

In the context of foregoing, the following infrastructure facilities can be identified:

- i) Most of the institutes engaged in textiles education have adequate infrastructure in respect of laboratories, class rooms, faculty, etc., for academic training. However, the intake of students is limited, and incremental infrastructure may be required to enhance their capacity to cope with the incremental requirement of manpower for the textiles industry.
- (ii) A phenomenal increase in the requirement of manpower for garment industry has been projected. ATDCs, and other similar institutions have to be revamped and their infrastructure has to be multiplied for massive training of tailors, operatives, cutters, pattern makers, maintenance staff, etc.
- (iii) In the garment sector, a large number of private training institutes have come up throughout the country. Their infrastructure, training facilities, etc., may be examined and strengthened, wherever required. In the coming years, private training institutes should be encouraged by appropriate support, particularly in States where unemployment is rampant.
- (iv) There are 44 Powerloom Service Centres spread throughout the country. Most of them conduct training programmes for the skill-development of workers. However, the intake of trainees is restricted due to the limited infrastructure available with them. They can play very important role in training because of their proximity to the decentralised powerlooms sector, close interaction with the industry and linkage to their parent bodies like TRA's. These PSCs will be useful for giving training in the garment sector and also for the training of operatives. Accordingly, infrastructure in the area of garmenting will have to be created in PSCs.
- (v) Four Indian Institutes of Handloom Technology under Central Government, and two in the private sector may be streamlined to undertake training programmes for the textiles industry in addition to

the handlooms industry. This will entail restructuring their infrastructure and strengthening them to undertake industrial training for the skill development of the operatives in the textiles and garment industry. Their infrastructure should be revamped to undertake multifarious activities in training.

- (vi) Similarly, 24 Weavers' Service Centres located throughout the country including remote areas should be restructured by enhancing their infrastructure to train the workforce for skill development and skill upgradation. They can play an important role in training of potential labour force in "catchment" areas from where they migrate to industrial clusters. They need not remain handlooms-centric, but function as integrated centres for textiles related training.
- (vii) Textiles Research Associations can play an important role in the field of textiles education and training, particularly that related to the emerging technologies, modern plant & machinery, quality and productivity improvement, etc. All of them have been conducting routine as well as tailor-made programmes, as required by the textiles industry. However, the intake of trainees is limited, and infrastructure and training facilities have to be strengthened if regular training programmes on a large scale is to be undertaken by the TRAs. Only one TRA, viz., SASMIRA, conducts institutional training with an intake of 1000 students, yearly. Such infrastructure may be created in other TRAs also.
- (viii) New Training Centres may be established in areas from where the labour force normally migrate to the industrial clusters. Sources for this labour force in the textiles and garment industry are in the rural areas of U.P., Bihar, Orissa, A.P., etc. It may be expedient if training infrastructure can be created at the doorstep of such "catchment" areas for the labour force. Tailors, weavers, etc., being community based professions, such institutional training will help unemployed rural youth from other communities to be trained in a profession with such

employment potential. Such training infrastructure can be created in the Weavers' Service Centres, PSCs, ATDCs, etc.

- (ix) Educational Institutes engaged in textiles training are geographically dispersed throughout the country. They may set up 'training centres' as an extension service. Necessary infrastructure facilities will have to be created to make them effective.
- (x) Considering the massive requirement of trained manpower, the infrastructure facilities and the potential strength of the 5000 ITI's, both in the Government and Private sectors, should be harnessed. Training in core technology of textiles is not a part of the training schemes of ITI's so far. Infrastructure for textiles training may be created in these ITI's providing textiles machinery, workshop, laboratories, etc. as well as trainers. An attempt has been made by the Government of India to identify specific ITIs for the textiles industry. Many more will have to be set-up.

3.5 Grants / Finance for HRD

It is obvious that, for training at this scale, great financial investment will be required. This is a complex issue and requires detailed deliberation and examination. While the Government is expected to act as an initiator and catalyst, the stake-holders in the industry will have to share such investment in industrial training which, in the long run, will benefit the industry.

CHAPTER – IV

DOVETAILING OF TRAINING INITIATIVES

4.0 Mechanism to synergize the operation of all Government Institutions

There should be a Central Body to plan, synergize, implement, co-ordinate and monitor all textiles education and training programmes. It is advisable to set up a Steering Committee for Training under the Ministry of Textiles, which will implement, co-ordinate and monitor. The following is an indicative list of members:

1. Textiles Commissioner.
2. Joint Secretary, Ministry of Textiles.
3. Two or more selected Textiles Institutes, Government & Private from different geographical regions.
4. Directorate General of Employment & Training, Ministry of Labour.
5. Two or more Textiles Research Associations (TRAs).
6. D.G., NIFT.
7. Secretary General, AEPC (for ATDCs).
8. Representatives of the State Governments (Technical Education).
9. Jute Commissioner.
10. A representative of the Machinery Manufacturing Association.
11. A representative from Textiles Industry Associations.

The task of synergizing the training course, mode of training, area of training, curriculum and course content, etc., can be assigned to the Office of the Textiles Commissioner, who may co-ordinate the HRD activities in association with the Sardar Vallabhbhai Patel Institute of Textiles Management, and other selected training institutes. Training for skill-development, skill upgradation,

entrepreneurship development, textiles management, etc., will call for a nationwide programme. Effective co-ordination for this training effort will be the key to its success. Syllabi, course-content, and duration will have to be determined for each segment of activities, sector-wise, depending on specific training needs. The main thrust in this regard will be the efficacy and immediate utility of the trainees in their allotted tasks in the industry. Course content should be focussed, and the trainees should not be burdened with irrelevant and extraneous details, which are not primary to the objective of the training.

The objectives of this mechanism to synergize the operation of all institutes, training centres, etc., and improving their functioning may be as follows :

- i) To integrate (depending on their location) the activities of various service centres, such as, powerlooms service centres, weavers' service centres, jute service centres, etc., under Ministry of Textiles, Government of India, to cater to the requirement of any sector of textiles.
- ii) To ensure that institutions, such as, IIHTs, IICT, etc., are converted to include multi-disciplinary training activities in textiles.
- iii) To ensure that Textiles Research Associations, NIFT, ATDC, are equipped to create trainers for training in the various field of textiles.
- iv) To develop curricula which will help Government and private institutions in the textiles sector obtain international recognition in the field of HRD.
- v) To ensure that facilities for standardization and skill recognition are created at every cluster / Textiles Park, etc.
- vi) To ensure that infrastructure for education and training is available at all Integrated Textiles Parks and Clusters.
- vii) To develop a system for the periodic assessment of the efficacy of training programmes, by an independent third party. Such assessment will help in the reorientation and mid-course correction of the training programmes.

CHAPTER-V

Review of the Curricula and Syllabi of Regular Textiles Related Courses

5.0 Industrial Training Institutes (ITI) and Textiles Trades

Practically no ITI has structured Textiles Courses, though the National Council for Vocational Training (NCVT) has prescribed the syllabus and curriculum for some Textiles related courses. Approximately 20 Textiles and Clothing related trades have been included in the 1243 ITIs under the schemes of the Directorate General of Employment & Training, Ministry of Labour, Government of India, on the recommendation of NCVT. However, only a few ITIs run textiles related certificate courses. The standard of these courses does not meet the requirements of the industry. The list of trades relating to textiles, which are included in the curriculum of ITIs, is given below:

List of Trades related to Textiles and clothing included in courses offered in ITI by DGE & T

Sr. No.	S.No. as per the list of trades of DGE & T	Name of the Trade	No. of ITIs in which the trades are available		
			Govt.	Private	Total
1	15	Bleaching, Dyeing & Calico Printing	46	1	47
2	43	Clothing and Sewing	460	237	697
3	57	Dress Making	228	46	274
4	73	Fashion Technology	-	-	-
5	92	Hand Weaving of Niwar Tape, Durries and Carpets	1	-	1
6	110	Knitting (Hosiery)	-	-	-
7	111	Knitting with machines	3	0	3
8	158	Mechanic Sewing Machines	-	-	-
9	185	Pattern Maker	59	1	60
10	198	Printing (Textiles)	-	-	-
11	231	Tailor (General)	-	-	-
12	232	Tailor (Men)	-	-	-

13	233	Tailor (Women)	-	-	-
14	244	Upholster	3	0	3
15	243	Upholster	2	0	2
16	247	Weaver	-	-	-
17	248	Weaving	-	-	-
18	249	Weaving fancy and furnishing fabrics	-	-	-
19	250	Weaving of skill as Woollen fabrics	2	0	2
20	251	Weaving of Woollen Fabrics	4	0	4
Total			808	285	1093

Some ITIs have introduced certain elementary courses like dress making, tailoring, hand knitting, hand weaving, etc. to create self-employment in rural areas. These courses are not directed to the modern textiles industry.

As a first step, 75 to 100 ITIs located at 25 textiles clusters can be upgraded to introduce courses targeted at the current requirements of the Textiles Industry.

It is also felt necessary that selected ITI s / Private Institutes in the labour / workforce “catchment” areas like Bihar, Orissa and U.P should be equipped with all the facilities to conduct courses and training to meet the needs of modern textiles and garment units, located elsewhere (like Surat, and Bhiwandi etc.). Most of the workforce from States like Bihar, Orissa, U.P., A.P., migrates to these industrial clusters, seeking employment.

Currently, the NCVT plays a major role in recognising the ITIs and their syllabus. Its mandate is basically to:

1. Establish and award National Trade Certificates in engineering, non-engineering, building, textiles and leather trades and such other trades as may be brought within its scope by the Government of India
2. Prescribe standards in respect of syllabi, equipment, and scale of accommodation, duration of courses and methods of training
3. Recognise training institutions run by government or by private agencies for purposes of the grant of National Trade Certificates and lay down conditions for such recognitions

4. Recommend the provision of additional training facilities wherever necessary and render such assistance in the setting up of additional training institutions or in the organisation of additional training programs as may be possible.
5. Advises the Central Government regarding distribution to State Governments of the contribution of the Government of India towards expenditure on the Craftsmen Training Scheme. (**Annexure 6**)

The existing system of training, both at the ITI level, and through the Workers' Education Centres, under the Apprentices Act, 1961, does not meet the requirements of the textiles industry. The industry, today, cannot take any advantage from the existing training system especially at the operatives level. The number of specific trades in the ITIs for the textiles sector do not really cater to the textiles industry. The textiles industry can be divided into six major sectors, as given below, and training needs could be planned according to the cluster demand:

1. Spinning	2. Weaving
3. Wet Processing	4. Knitting
5. Garment Manufacturing	6. Wool and Woollen Textiles

Considering the above, the curriculum and syllabus for various courses to be started at ITI level are being suggested in Chapter VI of this report.

5.1 Assessment of Current Textiles Technology courses

There are about 150 technical institutes offering doctorate, postgraduate, undergraduate and diploma courses in textiles technology / textiles manufactures/ Textiles Engineering, Textiles Chemistry/Processing etc., across the country. Their location coincides with the presence of the textiles industry in that area. For example, during the last two decades, a number of Textiles Institutes, both at degree and diploma levels, have been established in Tamil Nadu. 25% of the

national degree level, and 40% of the national diploma level, Textiles Institutes are in Tamil Nadu. This is due to the rapid growth and increased concentration of the Textiles industry in Tamil Nadu.

Many of the old Textiles Institutes have obsolete/limited machinery and lab equipment, inadequate libraries, outdated curricula, small faculty and infrastructure, and negligible industry –institute interaction.

The current curricula of the Diploma and Degree level engineering courses needs to be re-oriented to make them relevant to the present needs of the textiles industry. The indicative alterations in the curricula given below can be introduced mid-course:

III Semester

- a) High Performance Fibres
- b) Textiles Mechanics
- c) Garment Dyeing
- d) Advanced Machineries

IV Semester

- a) In-plant Training of 30 days

V Semester

- a) In-plant Training of 20 days

VI Semester

- a) Fabric and Technical Textiles
- b) Textiles Marketing Management and Entrepreneurship
- c) CAM and IT in Textiles Industry
- d) Fabric Analysis Lab

2. Additions suggested for Undergraduate Program B.E / B.Tech in Textiles Technology (Table-III)

The Model Curriculum for Undergraduate Program in Textiles Technology approved by AICTE in 2001 was considered in detail. The Committee decided to recommend this program with some modification as suggested below:

- a) Practical training of 45 working days in summer following the IInd Year, and another 45 working days after III year, is recommended. Semester VI, kept for Industrial Internship can be used for important courses as suggested in the Table-III, given below.
- b) Table-III also shows the course content of the new courses that can be substitute the AICTE model curriculum for Textiles Technology.

These changes will go a long way in enhancing the employability of students who pass out from these institutes. They will also introduce the required tilt towards practical training which they require to make their transition to the factory level seamless.

Table-III

Branch : TEXTILES TECHNOLOGY

YEAR III

SEMESTER VI

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME					CREDITS
			L	T	P	Sectional Exam TA	Sectional Exam CT	Sectional Exam TOT	End of Session Exam	SUB TOTAL	
THEORY											
1.		Technical and Smart Textiles	3	1	0	30	20	50	100	150	4
2.		Apparel Technology	3	1	0	30	20	50	100	150	4
3.		Electronics and Instrumentation	3	1	0	30	20	50	100	150	4
4.		Functional Finishes	3	1	0	30	20	50	100	150	4
5.		Value Education	3	1	0	15	10	25	75	100	4
PRACTICALS											
6.		Technical and Smart Textiles Lab	-	-	3	25	-	25	25	50	2
7.		Apparel Technology Lab	-	-	3	25	-	25	25	50	2
8		Electronics and Instrumentation Lab	-	-	3	25	-	25	25	50	2
9		Functional Finishes Lab	-	-	3	25	-	25	25	50	2
10		Design of Experiments and Analytical Technique	-	-	3	25	-	25	25	50	2
		GENERAL PROFICIENCY	-	-	-	-	-	-	-	50	2
		Total	15	5	15					1000	32

TA – Teacher Assessment

CT – Class Test

ESE – End Semester Examination

Total Marks : 1000 Total Periods: 35 Total Credits

Technical and Smart Textiles: 4 credits (3-1-0)

Definition of smart and intelligent textiles. Passive and active functionality. Textiles with high protection and comfort properties. Extreme winter clothing with low heat transmission, heat absorbing, heat storing systems. Phase change materials, incorporation of PCMs in fibres and fabrics. Breathable textiles. Multifunctional textiles with incorporated electronics for integrated communication, music, health monitoring, defence support functions, wearable computers. Environmentally sensitive textiles- photochromic and thermochromic (chameleonic) fabrics, camouflage (radar shielding) fabrics, variable heat absorption surfaces, stimuli sensitive polymers such as temperature, pH, ionic, magnetic sensitive materials, design and their applications to textiles. Fibres as solar cells, Recent advances in multifunctional textiles.

Technical and Smart Textiles Lab: 2 credits (0-0-3)

Laboratory experiments related to the Technical and Smart Textiles course.

Apparel Technology: 4 credits (3-1-0)

Concept of apparel design and proportion. Low stress mechanical properties of fabrics and their effect on apparel production sequences. Anthropometrics; Apparel sizing. Pattern making and grading. Principles of marker making; spreading and cutting. Cutting methods. Quality control in the cutting room. Stitch classification, seam types and applications. Sewing faults, their causes and remedies. Choice of sewing needles and threads. Principles and comparison of machines available for a variety of sewing operations. Work aids-folders, special presser feet, feeding systems. Interlinings-classification and application. Fusing and pressing machines. Garment breakdown analysis. Application of stitch and seam types in apparel construction. Apparel production systems and material handling. Garment dyeing and finishing.

Apparel Technology Lab: 2 credits (0-0-3)

Laboratory experiments related to the Apparel Technology course.

Electronics and Instrumentation: 4 Credits (3-1-0)

Overview of electronics and controls in modern textiles equipments and machines. Overview of basic analog electronics: Elements (R, L, C, V, I), circuit laws and theorems. Overview of basic digital electronics: Gates and ICs. Sensors and transducers

(displacement, position, force, temperature, pressure, flow). Signal Conditioning. Control elements, systems and examples. Data acquisition, analysis, control and automation by microprocessors and micro controllers. Motor and power drives. Power control devices. Some applications of data acquisitions and control systems in textiles and case studies.

Laboratory: Experiments on sensors and transducers (displacement, position, strain, temperature, rotational speed). Basic analog circuits with diodes and transistors. Basic digital Gates. SCR and TRIAC control of motor speed. Data acquisition and control with microprocessors/microcontollers.

Electronics and Instrumentation Lab: 2 credits (0-0-3)

Laboratory experiments related to the Electronics and Instrumentation course.

Design of Experiments and Analytical Techniques Lab: 2 Credits (0-0-3)

Sampling techniques, sample size, Principles of experimental design. Selecting a statistical design. Running experiments in Blocks, Latin squares. Factorial Designs & Analysis. Fractional factorial experiments. Use of replicates. Techniques of optimisation. Response surface designs. Statistical principles in data analysis. Fitting data. Linear regression with one and several variables. Polynomial models. ANOVA. Use of computers. Software packages. Rank correlation, Coefficient of concordance. Sampling inspection. Acceptance sampling : OG curve, Acceptance sampling by variables, Producer risk condition. Control Chart: Average run length, Modified control limits for averages, Cusum chart.

Functional Finishes: 4 Credits (3-1-0)

Developments in finishing of fabrics and garments. Finishing of microdenier fibre & fabrics. Antibacterial finishes. Moisture management and comfort finishing. Developments in new concepts in textiles finishing. Microencapsulation techniques and

their application in textiles finishing. Nanofinishing of textiles fabrics. Developments in garment finishing.

Functional Finishes Lab: 2 Credits (0-0-3)

Experiments related to Functional Finishes.

Value Education: 4 Credits (3-1-0)

Present state of society achievement and maladies. Notions of progress, development and human welfare. Distinction between pleasure, happiness, good and pleasant, needs and wants. Universal human values. Complementarities of values and knowledge. Typical modern technologies – their impact on mankind. Fundamental characteristics of modern technologies – their relationship to values. Sustainability of modern technologies. Values for harmonious and sustainable developments. Rationales behind universal human values. Practical difficulties in living upto these values. Typical dilemmas. Need for inner transformation. Various approaches towards purification of mind. Concept of holistic development and holistic technologies. Integrating scientific knowledge and human values. Understanding of ethics.

3. Additions suggested for M. Tech Programs in Fibre Science and Technology / Textiles Chemistry and Textiles Engineering / Textiles Technology.

1. M. Tech. programs are of 2 year duration divided into 4 semesters.
2. Students are required to earn 60 credit. One elective course can be offered in II and III semesters.
3. Project work of 18 credits can be allotted and work started at the end of II semester. Project will last for a year during III and IV semesters. Assessment and grading will be done at the end of each semester.

4. M.Tech. Program

Name of the Programme	Fibre Science and Technology/Textiles Chemistry
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Distribution of Total Credits

Program Core (PC)	Program Elective (PE)	Total Credits
54	6	60

Semester wise Distribution of credits

Sem I	Sem II	Sem III	Sem IV	Total Credits
19	17	12	12	60

Scheduling of courses

Semester I					
	Course No	Title	Type	L-T-P	Credits
1	TTL 711	Polymer and Fibre Chemistry	PC	3-0-0	3.0
2	TTP 711	Polymer and Fibre Chemistry Laboratory	PC	0-0-3	1.5
3	TTL 712	Polymer and Fibre Physics	PC	3-0-0	3.0
4	TTP 712	Polymer and Fibre Physics Laboratory	PC	0-0-3	1.5
5	TTL 713	Technology of Melt spun Fibres	PC	3-1-0	4.0
6	TTL741	Coloration of Textiles	PC	3-0-0	3.0
7	TTL742	Theory and Practice of Textiles Finishing	PE	2-0-2	3.0
		Total Credits			19.0
Semester II					
1	TTL 714	Physical Properties of Fibres	PC	3-0-0	3.0
2	TTL 715	Technology of Solution Spun Fibres	PC	3-0-0	3.0
3	TTP 716	Fibre Production and Post Spinning Operation Laboratory	PC	0-0-4	2.0
4	TTL 743	Principles of Colour Measurement and Communication	PC	2-0-2	3.0
5	TTL 763	Technical Textiles	PC	2-1-0	3.0
7		Elective-I	PE	3-0-0	3.0
		Total Credits			17.0
Semester III					
1	TTL 744	Environmental Management in Textiles and Allied Industries	PC	3-0-0	3.0
2		Elective –II	PE	3-0-0	3.0
3	TTD 891	Major Project Part I	PC	0-0-12	6.0
		Total credits			12.0
Semester IV					
1	TTD 892	Major Project Part II	PC	0-0-24	12

List of program Electives for Fibre Science and Technology/Textiles Chemistry M Tech Program

Sr No	Course No	Title	L-T-P	Credits
1.	TTL 772	Computer Programming and it's application	2-0-2	3.0
2.	TTL 761	Costing Project formulation and appraisal	2-1-0	3.0
3.	TTL 717	Advances in Manufactured Fibres	3-0-0	3.0
4.	TTL 718	High Performance Fibres and Composites	3-0-0	3.0
5.	TTL 773	Design of experiment and Statistical Techniques	3-0-0	3.0
6.	TTL 765	Product Development	2-1-0	3.0
7.	TTL 866	Functional & High Performance Textiles	2-1-0	3.0
8.	TTL 724	Textured Yarn Technology	3-0-0	3.0
9.	TTS 890	Independent Study	0-3-0	3.0

M.Tech. Program

Name of the Programme	Textiles Engineering / Textiles Technology
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Distribution of Total Credits

Programme Core (PC)	Programme Elective (PE)	Total Credits
54	6	60

Semester wise Distribution of credits

Semester I	Semester II	Semester III	Semester IV	Total Credits
17	19	12	12	60

Scheduling of courses

<i>Semester I</i>					
	Course No.	Title	Type	L-T-P	Credits
1.	TTL 721	Theory of Yarn Structure	PC	(2-1-0)	3
2.	TTL 722	Mechanics of spinning processes	PC	(3-0-0)	3
3.	TTL 731	Theory of Fabric Structure	PC	(2-1-0)	3
4.	TTL 771	Electronics and Controls for Textiles Industry	PC	(3-0-2)	4
5.	TTP761	Evaluation of Textiles Materials I	PC	(0-0-2)	1
	TTL 714	Physical Properties of Fibres	PC	(3-0-0)	3
		Total Credits			17

Semester II					
1.	TTL 733	Selected Topics in Fabric Manufacture	PC	(2-1-0)	3
2.	TTL 763	Technical Textiles	PC	(2-1-0)	3
3.	TTL 773	Design of Experiments and Statistical Techniques	PC	(3-0-0)	3
5.	TTP762	Evaluation of Textiles Materials II	PC	(0-0-2)	1
	TTL 751	Apparel Engineering and Quality Control	PC	(2-0-2)	3
	TTL 761	Costing, Project Formulation and Appraisal	PC	(2-1-0)	3
		Elective I	PE	(3-0-0)	3
		Total Credits			19
Semester III					
1.	TTD 891	Major Project – Part I	PC	(0-0-12)	6
	TTL 866	Functional and High Performance Textiles	PC	(2-1-0)	3
		Elective II	PE	(3-0-0)	3
		Total Credits			12
Semester IV					
1.	TTD 892	Major Project - Part II	PC	(0-0-24)	12
		Total Credits			12

List of program Electives for Textiles Engineering/Technology M Tech Programme

S.No.	Course No.	Course Title	(L-T-P)	Credits
1.	TTL 732	Computer Aided Fabric Manufacturing	(2-0-2)	3
3.	TTL 762	Management of Textiles Production	(3-0-0)	3
4.	TTL 772	Computer Programming and its Applications	(2-0-2)	3
6.	TTL 764	Process Control in Spinning and Weaving	(3-0-0)	3
7.	TTL 723	Selected Topics in Yarn Manufacture	(3-0-0)	3
8.	TTL 765	Product Development	(2-1-0)	3
10.	TTS 890	Independent Study	(0-3-0)	3

DEPARTMENT OF TEXTILE TECHNOLOGY

TTL711 Polymer and Fibre

Chemistry:

3 credits (3-0-0)

Introduction to natural and synthetic polymers. Terms and fundamental concepts. Step-growth polymerization, Carother's equation. Functionality; Crosslinking. PET manu-facturing. Chain growth polymerization, Free radical polymerization, Kinetics of free-radical polymerization, initiator, termination, chain transfer, Mayo's equation, cage effect, auto-acceleration, inhibition and retardation. Polypropylene manufacturing. Acrylic manufacturing. Atom transfer radical polymerization, ionic polymerization, ring opening polymerization. Nylon-6 manu-facturing. Co-polymerization and its importance. Copolymer equation, reactivity ratio, tailor making of copolymer properties. Techniques of chain polymerization. Bulk, solution, emulsion, microemulsion and suspension polymerization. Chemical Modification of fibres. Polymer solution, Flory's theory. Interaction parameter. Molecular weight and its distribution by End group analysis, osmometry, light scattering, ultra centrifugation, gel permeation chromatography, intrinsic viscosity. Spectroscopic methods of polymer characterization such as, FTIR, UV, NMR.

TTP 711 Polymer and Fibre Chemistry Laboratory:

1.5 credits (0-0-3)

Identification of fibres by chemical and burning tests, polymerization of vinyl monomers such as styrene, acrylamide using bulk polymerization, solution polymerization, emulsion polymerization, radiation induced polymerization. Condensation polymerization and interfacial polymerization of nylon-6, Molecular weight measurement, Intrinsic viscosity and end group analysis, preparation of phenol-formaldehyde resin, Analysis of chemical structure by FTIR, UV spectroscopy.

TTP 712 Polymer and Fibre Physics Lab:

1.5 credits (0-0-3)

Characterization of fibres by Infrared spectroscopy, Density measurements, Thermal analysis such as Thermogravimetric Analysis (TGA), Differential Scanning calorimetry (DSC) and Thermo-Mechanical Analyser (TMA), Dynamic Mechanical Analysis (DMA), Sonic modulus, X-ray diffraction studies, Birefringence measurement, Optical microscopy studies, Scanning

Electron Microscopy (SEM) of fibres.

TTL 712 Polymer and Fibre Physics:

3 credits (3-0-0)

Molecular architecture in polymers, Configuration and conformation. Nature of molecular interaction in polymers, Cumulative interaction, Entanglement, Random chain model and rms end-to-end distance. Glass transition temperature (T_g), Factors affecting T_g. WLF equation, Rubber Elasticity, Melting and Crystallization, Models describing fibre structure, Fringed fibrillar and fringed micellar model, One phase model. Requirement of fibre forming polymers. Crystallinity and orientation. X-ray diffraction measurement of crystallinity, orientation, crystal size, small angle X-ray scattering. Measurement of density of fibres, Density crystallinity, Infrared spectroscopy for determination of orientation, crystallinity etc. Optical microscopy for measurement of birefringence. Internal and surface structure by electron microscopy. Thermal methods DSC TGA and TMA for structural investigation. Morphological structure of Cotton, Wool, Silk, Regenerated Cellulose, Polyester, Nylon, Polypropylene, Polyacrylonitrile.

TTL713 Technology of Melt Spun Fibres:

4 credits (3-1-0)

TTL714 Physical Properties of Fibres:

3 credits (3-0-0)

Introduction to fibre structure and requirements of fibre forming polymers. Moisture Relations: Moisture sorption and desorption in fibres. Sorption isotherms, Heats of sorption, Swelling and theories of moisture sorption. Mechanical properties: Mechanism of deformation in fibres. Principles of elasticity and viscoelasticity. Creep and stress relaxation. Boltzmann superposition principle. Dynamic mechanical properties. Model theory of visco-elasticity. Time- temperature superposition principle. Stress- strain relations. Yield and fracture. Fibre friction, its nature, theory, application and measurement. Optical properties: Polarizability and refractive index. Birefringence and its measurement. Thermal Properties; Thermal expansion. Thermal conductivity, Electrical Properties: Dielectric properties, effect of frequency and temperature on dielectric constant. Electrical resistance and its measurement. Static electricity and

measurement of static charge in fibres.

TTL 715 Technology of Solution Spun Fibres:

3 credits(3-0-0)

PAN properties. Solution rheology and its dependence on parameters. Effect of parameters on entanglement density, fibre spinning and subsequent drawing. Various solvent systems. Dope preparation. Wet and dry spinning processes. Effect of dope concentration, bath concentration, temperature, and jet stretch ratio on coagulation rate, fibre breakage and fibre structure. Modeling of coagulation process, properties and structure of dry and wet spun fibres. Dry jet wet spinning of PAN and its advantages. Gel spinning. Melt spinning of PAN. Bicomponent and bulk acrylic fibres. Acrylic fibre line, crimping and annealing, tow to top conversion systems. Viscose rayon process, wet spinning. Zinc sulfate spinning. Polynosics and high performance fibre. Lyocell process, structure and properties. Gel spinning of PE, introduction to high performance fibres and their spinning systems such as rigid rod polymer, liquid crystalline polymers, polylactic acid and spandex fibre manufacturing.

TTP716 Fibre production and post-spinning operations

Laboratory:

2 Credits (0-0-4)

Experiments related to fibres production processes. Effect of moisture and temperature on MFI of PET and PP. Melt spinning of PET, PP & nylon-6 filament yarns on laboratory spinning machines. Single and two stage drawing of the as-spun yarns or industrial POY. Demonstration of high speed spinning machine. Wet and dry heat setting of PET and nylon drawn yarns. Effect of temperature and tension on heat setting. Determination of structure and mechanical properties of as spun, POY, drawn and heat set yarns using DSC, X-ray, FTIR, density, sonic modulus. Effect of shear rate, temperature on polymer solution viscosity using Brookfield Rheometer and ball-fall method. Wet spinning or dry jet wet spinning of PAN copolymers. False twist and air jet texturing processes. Determination of structure of textured yarn under microscope.

TTL717 Advances in Manufactured Fibres:

3 credits (3-0-0)

Profile fibres, hollow & porous fibres, spandex fibres. Biodegradable fibres, polyglycolic acid fibres, polylactic acid fibres, chitosan fibres, their preparation properties and applications. Bicomponent fibres, blended fibres. Fibres in medicine and biotechnology. Aesthetic fibres, bio-mimicking fibres. Membranes. Smart fibres. Comfort fibres. Fibres for Ballistic protection. Microdenier fibre. Spun Bonded and Melt blown nonwovens. Photochromatic fibres. Plasma processing of textiles. Processes for manufacturing of tapes and films.

TTL718 High Performance Fibres and Composites:

3 credits (3-0-0)

TTL721 Theory of Yarn

Structure:

3 credits (2-1-0)

Types of yarn. Role of yarn structure on yarn and fabric properties. Structural parameters of yarn. Twisting forms and yarn contraction. Morphology of staple yarns. Fibre characteristics in sliver, roving and yarns. Comparative analysis of structural characteristics of various types of spun yarns. Influence of fibre characteristics on yarn structure. Tensile behaviour of filament, spun, core spun and elastic yarns. Bending behaviour of yarns. Frictional behaviour of yarns. Rupture behaviour of filament and spun yarns. Geometry of plied structure. Tensile properties of plied structures.

TTL 722 Mechanics of Spinning Processes:

3 credits (3-0-0)

Cotton fibre selection through bale management. Forces on fibres during opening and cleaning processes and its effect. Carding process. Analysis of cylinder load and transfer efficiency. Technological considerations in the design of high production card. Card wire geometry, Fibre configuration in card and drawn sliver. Hook removal and its significance. Sliver irregularity. Fibre movement in drafting field. Suppression of drafting wave. Drafting force. Roller slip. Roller eccentricity and vibration. Fibre fractionation in comb. Combing performance. Principles of autolevelling. Blending of fibres, evaluation of blending efficiency. Analysis of forces on yarn and traveller. Spinning tension in ring and rotor spinning. Spinning geometry, Twist flow in ring and rotor spinning. End breaks during spinning. False twisting principles.

TTL723 Selected Topics in Yarn Manufacture:

3 credits (2-1-0)

Spinning of micro denier fibre. Synthetic fibre spinning on cotton spinning system. Spinning of dyed fibres. Principle of woollen and worsted spinning systems. Influence of high draft on yarn quality. Optimization of production speeds. Production of core and elastic yarns, sewing thread, acrylic bulk yarn, carpet yarn and fancy yarns. Waste fibre spinning. Mechanical and electrical drives. Energy conservation and saving through process optimization. Yarn conditioning. Yarn clearing devices. Selection criteria for aprons, cots and top rollers. Design of bottom drafting rollers. Future expected innovations. Control systems in spinning machinery.

TTL724 Textured Yarn Technology:

3 credits (3-0-0)

TTL731 Theory of Fabric

Structure:

3 credits (2-1-0)

Engineering approach to fabric formation. Fibre, yarn and fabric structure-property relationships. Crimp interchange in woven fabric. Elastica model for fabric parameters and crimp balance. Concept of fabric relaxation and set. Practical application of geometrical and elastica models.

Uniaxial and biaxial tensile deformation of woven fabric. Bending deformation of woven fabric, bending behaviour of set and unset fabrics and bending in bias direction. Bending, Shear and drape properties of woven fabric. Buckling and compressional behaviour of woven fabrics. Mathematical models and their application in the study of tensile, bending, shear, compressional and buckling deformation of woven fabrics.

Structure and properties of knitted and nonwoven fabrics.

TTL 732 Computer Aided Fabric Manufacturing:

3 credits (2-0-2)

Electronic Dobby: Working principle, constructional variants, design of the electronic dobby, drive arrangement, systems for pattern data transfer.

Electronic Jacquard: Working principle, constructional variants, various electronic jacquard systems, selection system, pattern data transfer and management.

CAD for dobby, jacquard, label weaving and carpet: Development of Jacquard designs, process of drafting and sketch design, development of figures, composition of design, geometric ornamentation, arrangement of figures, weave simulation.

Laboratory: Working on electronic dobby and electronic Jacquard, working on CAD, development of various designs on CAD and development of design samples.

TTL733 Selected Topics in Fabric Manufacture:

3 credits (2-1-0)

Development trends in winding, warping and sizing machines for improving quality of preparation and cost, reduction with specific reference to shuttleless weaving machines. Tension control and automation in sizing.

Loom development trends and objectives. Single phase and multiphase looms. Kinematics of sley and heald motion with reference to shuttleless looms. Theoretical analysis of weft insertion in shuttleless looms. Mechanism of warp breakage; Cloth fell position, beat up force and pick spacing. Analysis of let off mechanism, electronic let off and take up. Electronic jacquards. Developments with reference to energy saving, noise reduction and waste control. Electronic data acquisition in a loom shed.

Knitting: Dynamics of knitted loop formation. Design and performance of high speed knitting cams. Developments in knitting machines. Developments in processing machineries for knitted fabrics. Yarn feeding devices on circular knitting machines and design features of positive feeders.

Nonwovens: Fibre/filament arrangement in web and its effect on mechanical properties of nonwoven fabrics. Failure mechanism in different nonwoven fabrics. Effects of machine, fibre and process variables on properties of nonwoven fabrics. Production of spun bonded and melt blown fabrics.

TTL741 Coloration of Textiles:

3 credits(3-0-0)

Developments in dyes and dyeing processes for the dyeing of various textile substrates with various dye classes. Dyeing of blends. Mass coloration of man-made fibres. Development in

printing methods and machines. Direct, resist and discharge styles of printing. Printing of blends. Transfer printing. Physicochemical theories of the application of dyestuffs to textile and related materials, including the thermodynamics and kinetic principles involved. Dye-polymer interactions. Role of fibre structure in dyeing.

TTL 742 Theory and Practice of Textile Finishing:

3 credits (2-0-2)

General overview of the recent technological developments in the area of textile finishing. Special emphasis will be on formaldehyde free finishes for wash-n-wear and durable press applications, fire retardants for apparel and industrial textiles, silicon and amino silicon softeners, fluoro-chemicals for water repellency and soil release functions, water proof breathables-principles and technology involved in their production, surface modifications of textiles and their impact on various functional properties, antistats for synthetic fibres / fabrics, micro-encapsulation and its relevance in textile finishing application, new finishes for different functional and aesthetic requirements.

TTL743 Principles of Colour Measurement and Communication:

3 credits (2-0-2)

TTL744 Environmental Management in Textile & Allied Industries:

3 credits (3-0-0)

Importance of ecological balance and environmental protection. Definition of waste and pollutant. Pollutant Categories and types. International and Indian legislation and enforcing agencies in pollution control. Waste management approaches; Environmental Management Systems-ISO 14000. Environmental impact along the textile chain from fibre production to disposal. Toxicity of intermediates, dyes and other auxiliaries etc. Pollution load from different wet processing operations. Textile effluents and their characterization. Technology and principles of effluent treatment. Advanced colour removal technologies, Recovery and reuse of water and chemicals. Air and noise pollution and its control. Eco labeling schemes. Industrial hygiene and safe working practices. Analytical testing of eco and

environmental parameters. Eco friendly textile processing: waste minimization, standardisation and optimisation, process modification, safe & ecofriendly dyes and auxiliaries. Organic cotton, natural dyes, naturally coloured cotton, Solid (fibre & polymer waste) recycling-recovery of monomers, energy recovery and chemical modification of fibre waste.

TTL 751 Apparel Engineering and Quality Control:

3 credits (2-0-2)

Mechanics of sewing operation: Feeding mechanism, mechanism of generation of needle thread tension, feed dog setting mechanism, stresses and heat generated during sewing, interaction of feed and pressure, sewing dynamics. Measurement and controls in sewing operation: Pressure, sewing speed, thread tension, needle temperature, needle penetration force. Automation in sewing operation.

Fabric quality assessment for clothing industry: Fabric quality requirement for high quality garments, low stress fabric mechanical properties and their effect on sewing operation. Use of FAST and KES system. Fabric mechanical properties and sewing operation interaction: Tailorability and formability. Lindberg theory, optimization of sewing parameters by using fabric mechanical property, optimization of finishing parameters such as steam, pressure, vacuum, for getting desired effect.

Fabric defect analysis for clothing industry: Defect identification, bow and skewness, correlating defect with back process, valueless.

Quality control in apparel manufacturing: Determination of sewability, seam pucker, seam slippage and needle cutting index, evaluation of cutting defect, fusing defect, sewing defect, inspection of dimension, appearance, drape, change in color, shape and spots.

Measurement and selection of sewing thread properties for different fabrics: Optimization of sewing parameters such as ticket number, needle number, yarn tension, stitch density and stitch type for desired sewability.

Selection of lining and interlining fabrics for various shell fabric: Evaluation of lining and interlining fabric, determination of compatibility.

Packaging of finished garment, final random inspection of finished garments, packaging method, safety norms.

Accessories: Buttons, hook and eye, jips, velcro.

TTL761 Costing, Project Formulation and Appraisal:

3 credits (2-1-0)

Cost Concepts: Direct/indirect, Fixed/variable, Total cost. Inventory costing : FIFO, LIFO, Weighted average methods. System of costing : Job, order, batch, process, unit & operating cost joint & byproduct. Cost Standards in Textiles : Cost structure in textile industry, Cost of raw material/labour/utilities. Cost Control : Standard costs, variance analysis, determination of cost per kg of yarn, per kg (metre) of fabric, measures for cost reduction, selling price decision for yarn/fabric. Profit planning : Cost volume - profit analysis, Break Even point. Budgeting, Definition, purpose, types. Financial Statement & Investment Analysis : Profit & Loss account and Balance sheet analysis. Fund flow statement, Ratio analysis, Concept of cost of capital, IRR, DRC, DSCR, ERR, payback period and techniques for calculation.

Project Cycle: Phases of project cycle identification, preparation evaluation, documentation & Supervision. Various functions in project cycle - Technical, commercial, financial, economic, managerial.

Project formulation and Appraisal: Appraisal concept. Need for appraisal, Methodology. Various aspects - market, management, technical, financial and economic, Key financial indicators in appraisal, Investment decision from appraisal report, Post-project appraisal.

Evaluation of Technological Content of Textile Projects: The choice of Technology and their assessment, operating constraint, appropriateness of technology, factors influencing selection, various aspects of technology transfer.

Project Utilities and Environmental Aspects for Textile projects: Power, Steam, Fuel, Water, Compressed air, Air conditioning, Pollution (air, water, ground noise).

Special Appraisals: For Modernisation projects, balancing equipment, expansion and diversification projects (including backward & forward integration).

TTP 761 Evaluation of Textile Material - I:

1 credits (0-0-2)

Characterization of Fibre : Birefringence, sonic modulus, density measurements, thermal analysis, X-rays (orientation and crystallinity). Yarn Testing : Tensile properties, hairiness, cross-sectional studies and yarn preparation.

TTP 762 Evaluation of Textile Material - II:

1 credits(0-0-2)

Evaluation of spliced yarn and sized yarn. Testing of technical textile ; coated fabrics, geo-textiles, filter fabrics. Simulation of knitted and woven structure, comfort properties of fabric, water repellency. Computer colour matching, measurement of U-V protective character of textile material.

TTL762 Management of

Textile Production:

3 credits (2-1-0)

Indian Textile Industry: Structure, production and exports. Textile Policy. Sickness of Textile Industry- Analysis and options. Essentials of production management, production systems, classification. Material management: Role of material management techniques, purchase management, acceptance sampling and inspection, vendor rating system, inventory management. Production, planning and control: types of production systems and problems of planning and control, product section design, process planning, forecasting, planning of batch, mass and job shop system. Machine balancing. Layout and material handling. Machine assignment and allocation of jobs. Maintenance management: maintenance concepts, maintenance strategies, maintenance planning. Productivity and improvement techniques. Quality management: Introduction to TQM, concepts of value and quality assurance, total quality control, quality circles, ISO 9000. Marketing management: fundamental of industrial marketing, industrial buyer behaviour model. Marketing: systems selling, role of service, marketing planning and marketing strategies. Enterprise resource planning: Role of information in managerial decision making, information needs for various levels of management, decision makers, management information system, resource monitoring and control. Product mix. Case studies.

TTL763 Technical Textiles:

3 credits (2-1-0)

Definition, classification, products,

market overview and growth projections of technical textiles. Fibres, yarns and fabric structures in technical textiles and their relevant properties. Filtration: Textile and other filter media for dry and wet filtration. Mechanisms of separation. Requirements for good filter media and filtration. Fibre and fabric selection for filtration.

Geotextiles: Types and application of geosynthetics. Functions and application areas of geotextiles. Fibres and fabric selection criteria for geotextile applications. Mechanics of reinforcement, filtration and drainage by geotextiles. Soil characteristics. Methods of long term prediction of geotextile life and survivability in soil.

Automotive Textiles: Application of textiles in automobiles. Requirement and design for pneumatic tyres, airbags and belts. Methods of production and properties of textiles used in these applications.

Sewing threads, cords and ropes: Types, method of production and applications. Functional requirements, structure and properties.

Miscellaneous: Functional requirements and types of textiles used for paper making, agricultural, architectural, packaging and footwear.

TTL764 Process Control in Spinning & Weaving:

3 credits (3-0-0)

Optimum fibre-mix for various end use requirements. Yarn realization. Waste control in blowroom and card for all types of fibres spun on cotton system. Minimisinglea count variation. Controlling yarn irregularity, imperfections and faults. Yarn tenacity and elongation. Hairiness. Machinery audit. Indices of productivity. Production of high quality export yarns. Trouble Shooting, some case studies.

Role of ambient temperature and humidity. Life of accessories. Workload.

Principles for control of productivity in different sections, Contribution of control in yarn, winding, warping, sizing & weaving to the cost of production in fabric manufacture.

Splicing, machine allocation and load distribution. Control of migration in sizing, size droppings, sizing materials.

Loom allocation. Control of value loss in fabrics through evaluation & grading of fabric defects. Temperature and humidity

control & its effect on performance. Control of loom accessories. Control of loss of efficiency by snap study. Controls in the process of high twist yarns, blended yarns, filament yarns in warp and weft.

Controls in the winding for processing yarns for dyeing & knitting. Controlling sloughing off during winding, warping & weaving. on-line data system and its use in controls.

TTL765 Product

Development:

3 credits (2-1-0)

Overview of developments. Scope of product development in textiles and clothing. Designing for functions aesthetics. Designing for apparel, clothing and industrial applications. Product improvement and product innovations in textiles. Demand estimation and product development objectives. Interaction between-properties of fibre, yarn, fabric and garments properties. The product development process - requirements, key characteristics, recourses, conceptual design, technology selection, material selection, sampling, design and evaluation. Design logic, specifications, costing, manufacturing strategies and evaluation of new products. Standards, testing and specifications for new products. Case studies from the point of view of developing textile products for selected end use applications.

TTL771 Electronics and

Controls for Textile Industry:

4 credits (3-0-2)

Overview of electronics and controls in modern textiles equipments and machines. Overview of basic analog electronics: Elements (R, L, C, V, I), circuit laws and theorems. Overview of basic digital electronics: Gates and ICs. Sensors and transducers (displacement, position, force, temperature, pressure, flow). Signal Conditioning. Control elements, systems and examples. Data acquisition, analysis, control and automation by microprocessors and micro controllers. Motor and power drives. Power control devices. Some applications of data acquisitions and control systems in textiles and case studies.

Laboratory: Experiments on sensors and transducers (displacement, position, strain, temperature, rotational speed). Basic analog circuits with diodes and transistors. Basic digital Gates. SCR and

TRIAC control of motor speed. Data acquisition and control with micro processors/ micro controllers.

TTL772 Computer Programming and its Applications:

3 credits (2-0-2)

Fundamentals of Computer Programming, Programming Methodology: Structured Programming and concepts of Object-Oriented Programming.

Programming in C++ - Statements and Expressions, Control statements. Structure, Functions: Function Overloading etc.

C++ as Object-Oriented Programming Language- Classes and Objects, Data Abstraction, Inheritance - Multilevel and Multiple inheritance etc., Polymorphism - operator overloading and virtual functions, file handling.

Application development using C++.

TTL773 Design of Experiments and Analytical Techniques:

3 credits (3-0-0)

Sampling techniques, sample size, Principles of experimental design. Selecting a statistical design. Running experiments in Blocks, Latin squares. Factorial Designs & Analysis. Fractional factorial experiments. Use of replicates. Techniques of optimisation. Response surface designs. Statistical principles in data analysis. Fitting data. Linear regression with one, and several variables. Polynomial models. ANOVA. Use of Computers. software packages.

Rank correlation, Coefficient of concordance. Sampling inspection. Acceptance sampling: OC curve, Acceptance sampling by variables, Producer risk condition.

Control Chart: Average run length, Modified control limits for averages, Cusum chart.

TTL 866 Functional and High Performance Textiles:

3 credits (2-1-0)

Protective clothing: Clothing requirements for thermal protection, ballistic protection, UV-protection, protection from electro-magnetic radiation and static hazards, protection against micro-organisms, chemicals and pesticides. Design principles and evaluation of protective clothing.

Medical Textiles: Textiles in various medical applications. Application oriented designing of typical medical textiles. Materials used and design procedures for protecting wounds, cardiovascular application, sutures etc.

Sportswear: Clothing requirements for different sports. Development of highly functional fibres, yarns and fabrics for temperature control and moisture management. Stretch, bulky and light weight fabrics.

Composites: Two and three dimensional fabrics and triaxially braided materials for composites. Production and properties of performs and composites. Properties and uses of rigid composites.

Stimuli sensitive intelligent textiles - their production, properties and applications. Smart textile incorporating functional devices.

Miscellaneous: Glass, ceramic and metallic fibres and their textile products.

TTS890 Independent Study (Fibre Science & Technology):

3 credits (0-3-0)

Student should undertake a research oriented activity including software development, machine design and

development, instrumentation, product and process development or indepth study of a subject of outside the regular courses offered in the programme. This study should be carried out under the guidance of a faculty member. The subject area chosen by the student should be sufficiently different from the area of major project being pursued by the student. The student must submit a detailed plan of work for the programme coordinator before approval of registration for the course.

TTS891 Independent Study (Textile Engineering):

3 credits (0-3-0)

Student should undertake a research oriented activity including software development, machine design and development, instrumentation, product and process development or indepth study of a subject of outside the regular courses offered in the programme. This study should be carried out under the guidance of a faculty member. The subject area chosen by the student should be sufficiently different from the area of major project being pursued by the student. The student must submit a detailed plan of work for the programme coordinator before approval of registration for the courses.

TTD891 Major Project Part-I (Fibre Science & Technology):

6 credits (0-0-12)

TTD892 Major Project Part-II (Fibre Science & Technology):

12 credits (0-0-24)

TTD893 Major Project Part-I (Textile Engineering):

6 credits (0-0-12)

TTD894 Major Project Part-II (Textile Engineering):

12 credits (0-0-24)

5.2 Textiles Management Course

For development of managerial cadre manpower for textiles industry, recently a textiles management school has been set-up at Coimbatore by the Ministry of Textiles (SVPITM). This management school is yet to establish its infrastructure. Being a new institute the course content needs to be reviewed to meet the requirements of the industry.

Currently, this institute is offering two or three programmes at a time with a limited number of faculty and infrastructure facilities. The Institute should have more number of visiting faculty members (drawn from the industry), and reputed institutes like IIM, IIFT, IIT, NIFT. Course curriculum should have industry exposure and training. This would facilitate to develop the brand image of the institute.

CHAPTER VI

CURRICULA AND SYLLABI OF TRAINING COURSES

The proposed courses and curricula and syllabi can be divided into the following 4 parts:

1. Refresher courses of up to 15 days for persons already engaged / working in various sectors of textiles industry. (Textiles and clothing industry)
2. Short term courses up to 90 days for fresher in various sectors of textiles industry.
3. Short term courses of 90 days, (up to 3 months) for ITI fitters or candidates possessing education in engineering and who desire to seek employment as fitters / jobbers / technicians in various sectors of textiles industry.
4. 2 year regular course in an ITI in trades relating to Textiles, (Technician / Mechanic) for various sectors of the textiles industry.

6.0 REFRESHER COURSES:

Course Objective

- This would help the trainees in terms of updating and upgrading their skills to enable them to bridge the gap between their present skills and the latest developments in the textiles industry.

Target Group

- Meant for people who are already working in the Textiles and clothing Industry and have knowledge of their line of activity.

Course Content

- They will be exposed to advance training in areas of operation, technology, quality control, productivity, production planning etc as the case may be.

Training Module

- The syllabus for each course can be divided into two parts namely, Theoretical and Practical.
- The course content would vary according to the activity / trade / department.

The curriculum and syllabus for the following refresher courses is enclosed in Part II of this report as per the Annexure indicated below

1. Spinning :

- a) For Skilled Workers - **Annexure 7**
- b) For Operatives - **Annexure 8**
- c) For Fitters, Jobbers And Technicians - **Annexure 9**
- d) For Supervisors - **Annexure10**
- e) For Departmental Incharge - **Annexure 11**

2. Weaving:

- a) For Skilled Workers - **Annexure 12**
- b) For Operatives - **Annexure 13**
- c) For Fitters, Jobbers and Technicians - **Annexure 14**
- d) For Supervisors - **Annexure 15**
- e) For Departmental Incharge - **Annexure 16**

3. Knitting:

- a) For Skilled Workers - **Annexure 17**
- b) For Operatives - **Annexure 18**
- c) For Fitters, Jobbers and Technicians - **Annexure 19**
- d) For Supervisors - **Annexure 20**
- e) For Departmental Incharge - **Annexure 21**

4. Processing

- a) For Skilled Workers - **Annexure 22**
- b) For Operatives - **Annexure 23**
- c) For Fitters, Jobbers and Technicians - **Annexure 24**
- d) For Supervisors - **Annexure 25**
- e) For Departmental Incharge - **Annexure 26**

5. Clothing (Garment / Made ups)

- | | |
|---|--------------------|
| a) For Skilled Workers - | Annexure 27 |
| b) For Operatives - | Annexure 28 |
| c) For Fitters, Jobbers and Technicians - | Annexure 29 |
| d) For Supervisors - | Annexure 30 |
| e) For Departmental Incharge - | Annexure 31 |

6.1 SHORT TERM COURSES

Target Groups.

- Meant for people who do not have prior experience / adequate knowledge of the textiles and clothing industry, but possess the education required for particular the job.

Course objectives

- Meant for those who are keen to start their career in the textiles and clothing industry.
- Equip the individual with the requirements for a job in the textiles industry.

Course content

- Further orientation will be given in their area of preference or with respect to the industry needs.
- The level of subject coverage and practicals, etc., will vary in accordance with the academic qualification of the candidate, and the nature / level of employment desired. The probable minimum qualification can be pegged at 8th Std. Pass / Fail.
- The course content can vary according to the department.

Course modules

- The course is divided into two parts, namely theoretical and practical, including Industry visits, inplant training, as the case may be.

The curriculum and syllabus for following short term courses are enclosed in Part II of this report as per the Annexure indicated below :

1. **Spinning :**
 - a) For Skilled Workers - **Annexure 32**
 - b)For Operatives - **Annexure 33**
 - c) For Fitters, Jobbers and Technicians - **Annexure 34**
 - d) For Supervisors - **Annexure 35**
 - e) For Departmental Incharge - **Annexure 36**

2. **Weaving:**
 - a) For Skilled Workers - **Annexure 37**
 - b)For Operatives - **Annexure 38**
 - c) For Fitters, Jobbers and Technicians - **Annexure 39**
 - d) For Supervisors - **Annexure 40**
 - e) For Departmental Incharge - **Annexure 41**

3. **Knitting:**
 - a) For Skilled Workers - **Annexure 42**
 - b) For Operatives - **Annexure 43**
 - c) For Fitters, Jobbers and Technicians - **Annexure 44**
 - d) For Supervisors - **Annexure 45**
 - e) For Departmental Incharge - **Annexure 46**

4. **Processing**
 - a) For Skilled Workers - **Annexure 47**
 - b) For Operatives - **Annexure 48**
 - c) For Fitters, Jobbers and Technicians - **Annexure 49**
 - d) For Supervisors - **Annexure 50**
 - e) For Departmental In charge - **Annexure 51**

5. **Clothing (Garment / (Made ups) :**
 - a) For Skilled Workers - **Annexure 52**
 - b)For Operatives - **Annexure 53**
 - c) For Fitters, Jobbers and Technicians - **Annexure 54**
 - d) For Supervisors - **Annexure 55**
 - e) For Departmental Incharge - **Annexure 56**

6.2 SHORT TERM COURSES FOR ITI FITTERS ETC.

Target Group

- This course is meant for those who seek to work or are working in jobs at the level of fitters / technicians, jobbers, etc., in the textiles industry. The minimum qualification can be pegged at ITI or 10th Class.

Course Objectives

- To give practical orientation to unskilled workers who intend to take up a career as fitters / jobbers / technicians

Course Module

- The syllabus can be divided into two parts, namely, theoretical and practical, including industry visits and in plant training.

Course Content

- The course content can vary according to the department. It should include machine maintenance, viz., fitting, greasing, lubrication, gauzing, controlling temperatures, etc.

The curriculum and syllabus for the following short term courses for ITI fitters or candidates who possess education in the given engineering field are enclosed in Part II of this report as per Annexure indicated below:

- | | |
|---|-------------------------------|
| 1. Training for Textiles Technicians (Spinning)- | Annexure 57 |
| 2. Training for Textiles Technicians (Weaving)- | Annexure 58 |
| 3. Training for Textiles Technicians (Knitting)- | Annexure 59 |
| 4. Training for Textiles Technicians (Processing)- | Annexure 60 |
| 5. Training for Textiles Technicians (Clothings)- | Annexure 61 |
| 6. Training for Textiles Technicians
(Woollen Textiles & Clothing) - | Annexure 62 |
| 7. Others - | Annexure- 63,64 and 65 |

6.3 TWO (2) YEAR REGULAR COURSE IN ITIs IN TEXTILES AND CLOTHING

Target Group

- This course is meant for those who seek to work in the textiles engineering field after passing the 10th Standard

Course objective

- Equip candidates to be appointed directly in the textiles industry at the supervisory level and /or start their own enterprise.

Course Module

- Divided into theoretical, practical and industry visits including in-plant training.

Course Content

- Course syllabus will vary according to the department, like spinning, weaving, textiles mechatronics, processing, knitting and garmenting, woollen textiles and clothing.

The curriculum and syllabus for the following Two (2) year regular courses for ITI (textiles and clothing) are enclosed in Part II of this report as per the Annexure indicated below

1. Training for ITI certificate (Spinning)- **Annexure 66**
2. Training for ITI certificate (Weaving)- **Annexure 67**
3. Training for ITI certificate (Knitting / garmenting)- **Annexure 68 & 69**
4. Training for ITI certificate (Processing)- **Annexure 70**
5. Training for ITI certificate (Mechatronics)- **Annexure 71**
6. Training for ITI certificate (Woollen Textiles & Clothing) - **Annexure 72**

CHAPTER VII

SECTOR WISE TRAINING REQUIREMENT IN TEXTILES INDUSTRY

7.0 Sector-wise Manpower requirement vis-à-vis Investment:

The expected manpower requirement vis-à-vis investment (sector-wise) for the period from 2006-07 to 2010-11 is as follows as per the estimation by the Office of the Textiles Commissioner in consultation with industry, TRAs, and CRISIL Report :

Table-7.1

Expected Man Power Requirement vis-à-vis investment (Sector –wise)

S. No.	Sector	Investment (In Crores)	Additional capacity	Man Power Requirement (All Categories) (In Lakhs)
1	SPINNING	45,000	15 Million Spindles (31)*	5.75
2	WEAVING	30,000	84,000 Looms	1.57
3	KNITTING	10,000	21,000 M/cs (30,000)*	0.92
4	PROCESSING	30,000	75000 Million Metres	1.76
5	GARMENT	25,000	11.25 lakhs M/cs (18.75)*	40
	TOTAL	1,40,000	* Total including Replacements-	50.00

The existing work force in the various sectors of Textiles Industry in the category of skilled helpers, fitters, operatives, technicians / jobbers, supervisors and production in charge will also be required to be trained to cope with the operation, maintenance and production pattern of the modernized / technologically upgraded machinery / units. This will entail a relook / review / modification the existing curricula, syllabi, facilities, and capacity available for the various courses and training programmes relating to Textiles and Clothing Industry.

The assumption for these estimates are based on the level of investment projected by the CRISIL study, and prevalent practices in the textiles industry:

- There is likely to be an investment of Rs. 1, 40,000 crore in the textiles manufacturing & garment sectors.
- Certain norms for manpower have been taken from industry. For example, 18.24 persons for 1000 spindles in spinning sector.
- The investment is distributed in the various parts of the country – projecting the present growth pattern.

7.1 HRD gap assessment & proposal for training:

Sector-wise existing training facilities and the expected manpower requirement for the next 5 years has been worked out, based on the above presumptions.

7.1.1 HRD PROPOSALS FOR SPINNING:

Currently, SITRA, ATIRA and SIMA are the major organizations which offer formal training programmes to the spinning sector. In addition, around 100 Textiles mills have their own formal/informal training centres whose trainers have been trained by these organizations. These Textiles mills have also developed some training infrastructure facilities under the guidance of these organizations

The Southern India Mills Association (SIMA), the single largest employers' organization in India, render services to the Textiles Industry in the field of Industrial Engineering and HRD to improve their competitiveness by controlling the cost of production. The Association has conducted over 1000 HR programmes covering the Textiles employees at all level from unskilled worker to Chief Executives including the trade union leaders. The work norms recommended by the Industrial Engineering Division of the Association is widely accepted and recognised by all the Trade Unions and workmen across the country.

Present training capacity of the existing institutions for spinning and the expected manpower requirement in spinning sector for the next 5 years is given in the following tables

Table-7.2

Existing Institutions for Spinning Operative Trainings

Sl. No	Institution	Present training capacity / year
1	Textiles Research Associations	4,000
2	SIMA	2,000
3	In plant training	9,000

Table-7.3

Expected Man Power Requirement in Spinning Sector for next 5 years (2006-07 to 2010-11)

S. No.	Category	Man Power Requirement For Additional Spindles (15 millions) for Next 5 Years					
	Regions -->	Norms (per 1000 Spls)	South	North	East	West	Total
	Investment % -->		50%	25%	-	25%	100%
	Spindles(Millions)		7.5	3.75	-	3.75	15.00
1	Preparatory	11.78	88377	44188	-	44188	176753
2	Spg. Siders + Doffers	8.48	63631	31816	-	31816	127262
3	Bobbin carriers & Sweepers	2.12	15908	7954	-	7954	31816
4	Cone winder	3.54	26513	13256	-	13256	53026
5	Packing dept	2.83	21210	10605	-	10605	42421
6	Fitters,Maintenance & Ele	7.07	53026	26513	-	26513	106052
7	Total	35.82	268665	134333	-	134333	537330
	Management	2.51	18840	9420	-	9420	37680

The present training capacity of TRAs, SIMA, Spinning Mills (in plant training) in spinning operatives training is approximately 15,000 persons in a year. The expected Manpower requirement for additional 15 Million Spindles during the next 5 years would be 5.75 Lakhs to attend preparatory, Spg. Siders & Doffers, bobbin carriers, cone winding packing, fitting, maintenance, electrical and management functions.

7.1.2 Proposals for Training in Spinning

To meet the expected skilled man power requirement of 5.75 lakh for the next 5 years i.e upto 2010-11, the following HRD programmes are suggested

- TRAs, SIMA and Spinning Mills (in plant training) would continue to train around 15000 personnel per annum and there is no necessity to add to the existing capacity. Only some upgradation of modern infrastructure at the rate of 20-25 lakh Rupees may be done in 2-3 TRAs.
- All Machine suppliers, who are taking benefit under TUFs can be asked to train compulsorily at least 5-10 persons per 1000 spindles. M/s. Lakshmi Machine works, Coimbatore has already been giving some training in its campus, which is largely limited to mechanics. The scope of this training must be increased to include new entrants in this field. The list of potential trainees can be maintained with the Regional Offices of the Textiles Commissioner.
- Mills with capacity of more than 20,000 spindles should have proper training facilities. If possible, they may establish such training facilities in collaboration with machinery manufacturers / suppliers.
- There are some Textiles Engineering colleges which have infrastructure for training in the Spinning sector. They may upgrade and expand their training capacity.

7.1.3 HRD PROPOSALS FOR WEAVING

It is expected that around 1.4 lakh modern looms (Semi-auto, Auto and S/L) would be installed in the next 5 years with the expected investment of Rs.30000 crores. The details of manpower requirement and the training targets in modern weaving in the next 5 years period are given in the following tables.

Table-7.4**Expected Man Power Requirement in Weaving Sector for next 5 years
(2006-07 to 2010-11)**

S. No.	Category	Man Power Requirement for additional Looms for Next 5 Years					
		Regions -->	Norms (Operatives /Loom)	South	North	East	West
	Investment % -->		28%	10%	2%	60%	100%
	Looms		23,688	8,460	1,692	50,760	84,600
1	Preparatory	0.10	2314	826	165	4958	8263
2	Operatives Including helpers	1.47	34705	12395	2479	74368	123947
3	Jobbers/Technicians	0.20	4627	1653	331	9916	16526
4	Owners/ Managers	0.10	2314	826	165	4958	8263
	Total		43960	15700	3140	94200	157000

Around 1.57 lakh Personnel as preparatory manpower, operatives , weaver, Jobbers / technicians and Manager / Owner require to be trained in the next 5 years. It is proposed to train atleast 240 trainers in weaving preparatory, Weaving and Maintenance (Jobbers / Technicians) who will in turn impart training to freshers to take care of the expanding requirement of weavers / Jobbers.

7.1.4 Proposals for Training in Weaving

- Training for jobbers (mechanics) especially for most modern shuttle less looms will be a problem as this is not done in PSCs.
 - The machinery suppliers may be compulsorily asked (since they are selling their machinery under TUFS) to train at least 1 jobber per 10 machines. The list of potential jobbers may be supplied by Regional Offices of the Textiles Commissioner. Machinery suppliers may give jobbers training either at their location or at the existing PSCs. The foreign machinery manufacturers will also

have to be dealt separately, to set up / establish training facilities at different locations.

- Standardisation of syllabi and course content for all PSCs, particularly for imparting 2 or 3 months training in most modern looms, is required. Some upgradation of looms at PSCs will have to be done, as no PSC has Water Jet – Air Jet type of looms.
- In view of above intervention the existing training capacity will be sufficient to take care of the expanding requirement of weavers. No addition of PSC is suggested.

7.1.5 HRD PROPOSALS FOR KNITTING

The total investment in the knitting sector during the next 5 years would be Rs. 10,000 Crore. It is expected that around 30,000 knitting machines would be installed in the next 5 years. It is presumed that 30% will be on account of replacement of old knitting machines, and the remaining 70% will be new capacity. The total investment on plant and machinery would be approximately 6,000 Crore (at the rate of Rs.20 lakh per machine).

The details of expected manpower requirement and HRD training requirement in knitting sector in the next 5 years are given in the following tables.

Table-7.5

**Expected Man Power Requirement in Knitting Sector for next 5 years
(2006-07 to 2010-11)**

Sr .No	Category	Man power Requirement for Additional Capacity for Next 5 years					
		Norms (Crores)	South 4000	North 4500	East 1000	West 500	Total
	Regions Investment	(%)	40%	45%	10%	5%	100%
	Investments	(@Rs.20 Lakhs)	12000	13500	3000	1500	30000
	Knitting M/Cs 60% on (P&M)	New Capacity	8400	9450	2100	1050	21000
	Knitting M/Cs (70%) 30% Assumed as Replacement						
1	Preparatory	3.91	32850	36950	4110	8220	82130
2	Operative including Helpers	0.23	1932	2173	483	242	4830

3	Jobbers/ Technicians	0.12	1008	1134	252	126	2520
4	Owners/ Managers	0.12	1008	1134	252	126	2520
	Total		36798	41391	5097	8714	92000

92000 persons are required to be trained as operatives, Helpers, Jobbers / technicians and manager in knitting sector in the next 5 years to meet the HRD needs of 30,000 new knitting machines in knitting sector. The existing private institutions and machinery manufacturers / suppliers would take care of Training needs.

7.1.6 HRD PROPOSALS FOR PROCESSING

The activity of Textiles processing plays an important role in [the](#) marketing of textiles and clothing. It presents the [textiles products](#) in an aesthetic and presentable form, suitable for marketing. It imparts functional properties to the textiles products. It increases the value of Textiles products multi-fold (30-120% from fibres/yarn to fabric) especially in respect of specially finished Textiles goods, enabling high value realisation on domestic as well as on export front. A negligible quantity of textiles goods are sold to consumers in the grey form. It is either desized, scoured, bleached, dyed, printed or functionally finished. In other words, 95% of the Textiles goods are processed in some form or the other.

Structure of the Textiles Processing Sector

Independent Processing units are segmented into Hand Processing units and Independent Power Processing units, depending on their process technology and use of power. There are about 10500 hand processing units, and 2510 independent power processing units in the country. Though some of the hand processing units are operated by Power / electric motors, they continue to be classified as hand processing units. The independent power processing units are further segmented into SSI and Non-SSI units.

Table-7.6

Composition and Technology Level of Power Processing Units is as under:

Composite Units	59
Semi Composite units	167
Independent processing units	<u>2284</u>
Total	<u>2510</u>
Employment (Direct)	
SSI	54449
Non-SSI	121718
Annual Turnover	449874MnSq.Meters
No.of units of modern technology	227
No.of units of medium technology	1775
No.of unit with obsolete technology	322

Table-7.7

**Expected Man Power Requirement in Processing Sector for next 5 years
(2006-07 to 2010-11)**

Sr.No	Category	Man power Requirement for Additional Capacity for Next 5 years					
		Norms (% of total Man Power)	South	North	East	West	Total
	Regions						
	Investments	(%)	20%	10%	5%	65%	100%
	Investment	(Rs.Cr.)	6000	3000	1500	19500	30000
1	Preparatory	30%	9600	4800	2400	31200	48000
2	Dyeing	20%	6400	3200	1600	20800	32000
3	Printing & Fixing	20%	6400	3200	1600	20800	32000
4	Finishing	30%	9600	4800	2400	31200	48000
5	Jobbers / Technicians		1000	500	250	3250	5000
6	Owners / Managers		2000	1000	500	6500	10000
	Total		35000	17500	8750	113750	175000

Training Requirements in Processing

Processing is one of the most neglected areas in the entire value chain, and one of the weakest areas in India in Textiles Manufacturing. Hence, high quality processed fabric is largely imported. Manufacturers also export a substantial quantity of grey unfinished fabric. Hence, for value addition, we need to tackle both high end processing and low-end processing

High-end Processing

There is no institute providing training for masters / technicians who would go on to work on machines bought with the likely investment of Rs.30,000 crore in the processing sector in the next 5 years. As in weaving and spinning, the machinery suppliers in the processing sector (taking benefit under TUFS) may be asked to compulsorily train potential workers. It is strongly recommended that, initially, 2 training centres for textiles processing must be set up with substantial Government support. The likely cost of setting up a centre is Rs.15 - 20 crore towards capital cost for each Centre, and Rs.1-2 crore towards recurring expenditure. They can be started in an existing institution also like, MANTRA / SASMIRA and SITRA. Government may consider giving 50% of the capital cost to set up such an institute, and part of the recurring cost, to be tapered out in 3 years. The likely location – one in Western India (Surat – Ahmedabad – Mumbai area), and another in South (Tirupur – Erode area). Both these areas are major processing clusters.

Low-end Processing

1. SSI power processing (approx. 30,000 m / day per unit).
 - major clusters – Mumbai, Surat, Ahmedabad, Ludhiana, Amritsar, Tirupur with 1851 units.
 - 3 weeks compact training program on important aspects of; operation of machines; dyeing; printing; finishing and its preparatory processes will be required for at least 10 workers from each unit.
 - 6 Institutes (Polytechnic / ITI / TRA / PSC) can start training in 6 different clusters. One-time lab equipment grant of Rs.15-20 lakh / institute may be provided.
 - Initially the trainers should be outsourced and their salaries at the rate of Rs.15,000/- per month may be paid by Government. The cost per year for trainers would be Rs.15-20 lakh only, and Rs.10 lakh for consumables.

2. Hand processing

- 6 major clusters – Jetpur, Pali, Balotra, Jodhpur, Jaipur and Erode – around 1800 bigger units.
- Parliamentary Standing Committee on Labour (14th Lok Sabha) also emphasized on training needs for hand processing units.
- Requirement is to train at least 2 ‘masters’ per unit, i.e., 3600 persons.
- Training requirement (scientific knowledge of dyes and chemicals, processes and preparation of colours and paste, how to improve their existing techniques) is for at least 2 weeks. Outsourcing of trainers @ Rs.15,000/- per month per year which would cost Rs.12-15 lakh for trainers, and Rs.10 lakh for equipment.
- A regular certificate course of 6 months may be started in two ITIs. One time grant would be Rs.15-20 lakh, and recurring Rs.6 lakh per ITI per year.

7.1.7 HRD PROPOSALS FOR GARMENTING

It is expected that around 18.75 lakh new machines would be installed in the next 5 years, out of which it is presumed that 40% will be on account of the replacement of old machines, and the remaining 60% will be on account of new capacity created. The total investment in the Garment sector during the next 5 years would be Rs. 25,000 Crore.

The details of the expected manpower requirement and HRD training requirement in the Garmenting sector in the next 5 years are given in the following tables.

Table-7.8
Expected Man Power Requirement in Garment Sector for next 5 years
(2006-07 to 2010-11)

Sr .No	Category	Man Power Requirement for Additional capacity for next 5 year (in lakhs)					
		Norms (operatives M/C's)	South	North	East	West	Total
	Investments (%)		45%	40%	5%	10%	100%
	Sewing Machines in Lakhs		5.06	4.50	0.56	1.13	11.25
1	Operatives	3.48	17.60	15.65	1.96	3.91	39.12
2	Jobbers	0.03	0.18	0.16	0.02	0.04	0.39
3	Pattern Makers	0.02	0.09	0.08	0.01	0.02	0.20
4	Technicians / Quality Controller	0.02	0.09	0.08	0.01	0.02	0.20
5	Owners / Managers	0.01	0.04	0.04	0.00	0.01	0.10
	Total		18.00	16.00	2.00	4.00	40.00

Existing Institutions for Training in Garment Sector

- The training gap is **widest** in this area.
- ATDCs [total number – 14 presently [3 in the pipeline, and 16 under planning], are training about 12-15000 people, per annum. Some private institutions are also active in this area.
- ITIs across the country are training workers in the garment sector (around 20000-30000) – This is often in old technology & pedagogy. This does not meet the needs of the industry. Also, industry is not aware of where these people are trained.
- NIFT is giving technical advice/support to various State Governments to update syllabi, training, curricula, etc. NIFT also conducts training for trainees.

Proposals for Training in the Garment Sector

- Looking to the huge gap, training facilities must be created/updated in both the Government and Private sector.
- Funding may be on the Gujarat pattern.

- The Government of Gujarat gives assistance of upto Rs.2 crore to set up an apparel training centre to Government & Semi-Government institutions. For the private sector, a grant of 50 lakh or 50% (whichever is lower) is given. This pattern may be adopted by the Government of India also.
- There is an urgent need to:
 - i) Atleast triple the number to 70-80000 per annum.
 - ii) Standardise the course content to suit the needs of the industry.
 - iii) Improve the equipment/machinery with the latest standards.
 - iv) Training the trainers –as of now the technological status is about 15 years old.
 - v) Make the industry aware of the trainees coming out of these institutes.
- Similarly, Polytechnics, Home Science colleges are also coming out with Textiles (especially garment) trainees say about 4000-5000 per year. The same issues apply here to improve their acceptability by the industry.
- Private sector training institutes should also be given help to upgrade their equipment/course content. Help may take the form of a one time grant of upto 50% of the cost of equipment or 50 lakhs (whichever is lower)

7.1.8 Other Important Issues in Garmenting Training:

- Where to set up these training Institutes:

It is felt that in addition to setting up training institutes in apparel clusters, they should also be set up in labour-“catchment” areas like Bihar, Orissa, Eastern UP (as expressed by Secretary General, Apparel Export Promotion Council and President, Clothing Manufacturers Association of India). Accordingly, selected ITIs/private institutions in these areas may be particularly considered for this.

There is a strong need for coordination for the creation of training capacity in the garmenting sector which cannot only be addressed by ramping up capacities of the Apparel Training & Design Centres (ATDCs) or the ITI s. A new approach will have to

be taken in co-ordination with both the Ministries of Labour and other Ministries that have provisions for assisting and aiding implementation programmes for the rural and urban poor. In this, organizations like the Infrastructure Leasing & Financial Services (ILFS) & Industrial and Infrastructure Development Finance Company Ltd (IIDFC), who have a multi-sectoral approach to the development of infrastructure, can be used to set up training and educational facilities in the “catchment areas” referred to in this report. They should be permitted to access funds from the Ministries of Rural Development, Urban Welfare and the Ministry of Labour, under self-employment programmes being run by these Ministries.

- Training of Trainers

Most ITIs and even ATDC suffer in terms of both quality and quantity of trainers. The training skills of most ITI trainers are out of date by about 10-15 years. A refresher course of 2-3 months, which acquaints them with the latest equipment/techniques should be compulsory. It is proposed to train these trainers so that they can in turn train approximately 40 lakh workers during the next 5 year period, besides the training by ATDC, NIFT, ITIs and Home Science Colleges. It can be done in select TRAs/NIFT. .

- Constant Inspection/Supervision of Training Institutions:

It is felt that to maintain high standards of garment training, constant & compulsory inspection/supervision is a must.

Training institutions can be categorised in different grades (I, II, III etc.) on the basis of these inspections. This gradation may be publicized and future grants should only be on the basis of these grades.

Inspection Supervision can be carried out by NIFT, which is an autonomous body.

7.1.9 HRD in Woollen sector

- The woollen industry in India is small & scattered. India is the 11th largest producer of wool in the world. The anticipated annual production of indigenous raw wool is 55.10 million Kg (Approximately 1.8 % of the world). It is mainly located in the states of Punjab, Haryana, Rajasthan, Uttar Pradesh, Maharashtra &

Gujarat. Punjab accounts for 40% of the Woollen manufacturing units, whereas Haryana has 27 %, and Rajasthan 10 %. The remaining States account the approximately 23 %. The woollen industry is a rural, export – oriented industry. The organised sector comprises composite units, combing units, worsted & non-worsted spinning units, machine made carpet manufacturing units. The decentralised units include those producing hosiery & knitting, powerlooms, hand knotted carpets, druggets, namdahs, and independent dyeing & processing houses.

- The indigenous production of raw wool is about 45 Mn. Kgs, of which 85 percent is of carpet grade, and only 5 percent is apparel grade. The remaining 10 percent is coarse grade.
- The development of the wool & woollen sector depends mainly on the improvement of wool fibre and quality processing of wool.
- Specific orientation towards the woollen manufacturing process should be introduced / strengthened in the 4 year degree course and the diploma courses in the institutions located in the wool producing states like Rajasthan, Punjab, Himachal Pradesh, Jammu and Kashmir, and Karnataka. This should be done by the addition of curriculum relating to wool and woollen textiles. Some of these institutions are collaborating with wool producing countries, and can take up short term courses for the Indian wool and woollen textiles industry. Such an arrangement will equip these institutions with infrastructure and keep them abreast of the latest technology.

7.1.10 Employment in Woollen Sector

The exiting labour employed in woollen sector is as follows

- Organised Sector - 12 lakhs
- Sheep Breeding & rearing – 12 lakhs
- Carpet - 3.2 lakhs

Some training on the orientation of the work practice of the labour employed in the above sector should be imported by setting up training facilities in the Powerloom Service Centres located at the wool manufacturing clusters.

CHAPTER- VIII

8.0 DELIBERATION WITH INDUSTRY AND INSTITUTIONS

The 2nd HRD Committee constituted by the Ministry discussed the various issues relating to HRD needs of the Textiles Industry vis-à-vis various course contents, curriculum, syllabus and existing training facilities etc., among its members, in its meeting held in IIT, New Delhi on 26.05.2006. The Sub-Committee had detailed deliberations with the various industry representatives and principals / representatives of some of the related Institutions (including ITIs), in a seminar organised at IIT, New Delhi on 13.06.2006. The HRD managers, executives, managers incharge of production in the various sectors of the Textiles Industry actively participated in the deliberations. The outcome of the deliberations confirmed the following:

1. There is an acute shortage of operatives and fitters / jobbers for the modern machinery particularly in the weaving and garment sector.
2. Spinning mills have by and large, have their own training facilities for un-skilled and semi-skilled workers. However, for skilled labour and fitters there is a need of institutional training.
3. No formal / institutional training facilities are available for the operatives / jobbers / fitters in the processing sector.
4. At ITI level training in Textiles be imparted in all fields of activity such as weaving, stitching, knitting, printing and dyeing, etc., to meet the shortage of operatives / fitters etc.
5. Some states such as Himachal Pradesh & Madhya Pradesh stipulate by law the employment of locals, upto the extent of 60-70%. Therefore, in such States, training has to be organised locally. The State Government has to come forward to contribute significantly in terms of equity, finance, lands, and buildings for the establishment of appropriate training facilities in the State, in collaboration with Government of India, Ministry of Textiles.

6. Training facilities be provided in all the identified textiles clusters. These training facilities can be created in the private sector institutions, and Powerloom Service Centres by providing grants for the machinery, equipments, infrastructure and regular financial assistance to hire guest faculty / tutors / trainers. The TRA's and PSCs can play an effective role in providing training facilities / infrastructure in collaboration with manufacturers of textiles machinery and cluster level institutions, with the financial grants/ assistance from the Government of India, and / or respective State Government. In such arrangement the involvement of machinery manufacturers is important. They can install cut model machinery and depute their trainers to the PSC's to conduct regular training programmes. This exercise should be done at their cost.

7. Some machinery manufacturers have training facilities, and their charges / fees are, at times, expensive. Besides, such training facilities are very limited leaving a wide gap between the training capacity and the training need of the industry. They should be persuaded to lower these fees.

8. Some Tax benefit (on the lines provided to the R & D Sectors / establishment / centre) be given to industry to promote training culture in Industry.

9. Design / knowledge of Computers / IT and knowledge of human behaviours / personality development and labour laws etc., should be part of curriculum for the Diploma / Degree or PG courses. Exposure to Industry and the shop-floor should form an input experience throughout the course for the Diploma / Degree and PG level. Specific programmes should be included in the course so that students understand the needs of the industry, and that the industry can easily absorb the students who have been thus "broken-in" for the job.

10. Industry and institutes should have leadership training programme for persons required to play a supervisory level role.

11. Though most of the large garment units / industry have their own arrangement for the training of operatives, these are not up to the desired level of standard in many cases. There is shortage of training capacity for supervisory staff.

12. The persons employed in middle management level in Textiles industry need to undergo an orientation training programme at least once in 3 years. This can be looked after by TRAs and textiles institutions.

13. Product development should be part of textiles curricula.

14. Institutions should adopt some local industry for continuous interaction. The industry should also closely interact with institutions.

15. Textiles Institutions have moderate infrastructure which has to be upgraded.

16. It is felt necessary to have a system of periodical training for the faculty of ITIs and diploma / degree/ PG colleges, to update their technical as well as industrial knowledge, which would in turn benefit to the students.

17. There should be minimum 6 months training programmes for B.Sc. or B.A. and other non-Textiles graduate students, who are employed / being employed in the textiles industry to train them for specific jobs such as dyeing, printing, post spinning, post weaving etc. Such training can be taken care of by PSCs, by establishing proper infrastructure, facilities and installing a regular funding arrangement to hire experts / faculty by the training organisation.

18. Industrial training is an important component of the curriculum of professional Institutions. Industry must work together with institutions to work out a strategy which is beneficial for both. In this, the role of faculty and training in charges in industry is important.

19. Continuing education is an important component of training and be given due importance in all training organisations.

20. The CITI (Confederation of Indian Textiles Industry) should play an important role in co-ordinating with institutions and industry for fulfilment of the training needs of various sectors of Textiles industry.

21. The PSCs and the machinery manufacturers may set up joint training centres. The PSCs may provide the space and machinery can be provided by the machinery manufacturers.

22. There is need to upgrade laboratory, library and other infrastructure facilities in most of the Government run institutes. A large number of textiles polytechnics and private institutes have been established, particularly in Tamil Nadu and Karnataka. Most of these private institutes need to upgrade these facilities, and they have adequate space on their premises.

CHAPTER IX

FINDINGS AND RECOMMENDATIONS

9.0 Findings

1. There are about 250 major and minor Textiles Institutes in the Country in Govt./Private Sectors, teaching degree, diploma, post graduation in Textiles and Garmenting. The yearly in-take is approximately 5000 students at various levels. Besides, there are 118 training bodies in the country, like TRAs, PSCs, ATDCs, etc.
2. There are 4971 Industrial Training Institutes (ITIs) spread throughout the country. However, only 1243 ITIs offer training in textiles & garmenting, with a yearly intake of 33372. These ITIs do not provide training in hard-core textiles technology, but have good infrastructure for training of maintenance staff for textiles and garmenting.
3. The intake of students in Textiles Institutes is rather limited, and incremental infrastructure may be required to enhance their capacity to cope with the massive requirement of manpower for the textiles industry.
4. Training need-gaps have been identified in Garmenting, Weaving, Spinning, Knitting, new emerging technologies, modern machinery, I.T. Solutions, quality management, laboratory testing, entrepreneurship, environment obligations, training of trainers, etc.
5. There are 44 PSCs spread throughout the country. The intake capacity of trainees is restricted due to the limited infrastructure available with them. These PSCs can play a very important role in training due to their proximity to the clusters in the decentralised powerlooms sector, close interaction with the industry, and linkage to their parent bodies, like TRA's.

6. These PSCs have potential to provide training in the garment sector also.
7. There are 24 WSCs and 6 handloom institutes dealing only with handlooms technology training. They have the potential to venture into training for powerlooms and garmenting also.
8. TRAs conduct need based training programmes for the industry. The intake of trainees is limited. If their infrastructure and training facilities are strengthened, they can play an important role in training. They can also be used for the training of trainees.
9. Only one TRA, viz., SASMIRA, conducts institutional training for about 1000 students/year. Other TRAs, too, have such potential.
10. Currently, existing institutes like SVPITM offer a Textiles Management course, and can conduct only two or three programmes simultaneously because of their limited faculty and infrastructure facilities.
11. While there are a large number of institutes for supervisory and middle management employment, vocational training for workers in pre- or post-employment stages has not developed significantly in a structured and regular fashion. The Indian textiles workforce has generally developed within the industry, where newly inducted unskilled workers acquire their skills from their skilled colleagues engaged in the industry.
12. The manpower requirement, as observed, will be 5.75 lakhs in Spinning, 1.57 lakhs in Weaving, 92 thousand in Knitting, 1.76 lakhs in Processing and 40 lakhs in Garmenting, thereby throwing up the need to train approximately 5 million workers.

13. The existing workforce in various sectors of Textiles Industry, in the category of skilled helpers, fitters, operatives, technicians / jobbers, supervisors and production incharge, is also required to be trained to cope with the operation, maintenance and production pattern of the modern / technologically upgraded machinery / units. This underlines the need for a relook / review / modification of the existing curricula, syllabi, facilities and capacity available..
14. In the Spinning sector, the present training capacity of TRAs, SIMA, Spinning mills (in-plant training) is about 15000 per year. The expected manpower requirement to operate 15 million additional spindles during the next 5 years will be approximately 5.75 lakhs.
15. In the Weaving sector, it is expected that over 100000 new modern looms will be installed throughout the country in the next 5 years period, and the expected investment would be around Rs.30,000 Crore.
16. Approximately 1.57 lakhs workers will be needed as preparatory manpower, and operatives, weavers, jobbers / technicians, will be required to be trained in the next 5 years. It will be necessary to also train at least 240 trainers who will impart training to trainees to take care of the expanding requirement of Weavers / Jobbers.
17. In the Processing sector, there are approximately 10,500 hand-processing units, and 2510 independent power processing units in the country. Though some hand processing units are being operated by power / electric motors, they continue to be classified as hand processing units. Major power processing (approx. 30,000 m/day/unit) clusters are in Mumbai, Surat, Ahmedabad, Ludhiana, Amritsar, Tirupur. There are 1851 power processing units situated in these areas. Hand processing units are clustered in and around Jetpur, Pali, Balotra, Jodhpur, Jaipur and Erode, with around 1800 bigger units. This sector provides employment to about 1.76 lakh workers.

18. The Processing sector is one of the weakest areas in the Indian textiles scenario. Training needs for both lower- and higher-end processing will have to be addressed.
19. In the Garmenting sector, it is estimated that about 18.75 lakh new machines will be installed in the next 5 years. Of these, 40% will be on account of the replacement of old machines, and the remaining 60% will be new. The total investment in the garment sector during this period is estimated to be Rs.25,000 crores.
20. The training need-gap in the Garmenting Sector will be massive, and the widest amongst all sectors. A workforce of approximately 4 million will be required to be trained in the next 4 - 5 years. Not only will the capacity of existing institutes' like NIFT, ATDCs, ITIs, etc., have to be multiplied for the training of tailors, operatives, cutters, pattern makers, maintenance staff, etc., but a large number of private training institutes will also have to come up throughout the country. Their infrastructure, training facilities, etc., would require to be examined and strengthened.
21. The Woollen Sector consists of composite mills and decentralised units. The activities of composite mills include combing, worsted, woollen spinning, machine made carpet manufacturing. The decentralised sector comprises of Hosiery and Knitting, powerlooms, hand knotted carpets, dyeing and processing, etc. There is no Textiles Institute which conducts regular and structured training and education exclusively for the woollen sector.

9.1 Recommendations

- Government may consider the allocation of least Rs.100 crore per annum for HRD in the Textiles and Clothing industry.
- All parks coming under the scheme for Integrated Textiles Parks may be asked to compulsorily earmark 5% of the Government grant to set up HRD & training

facilities. They should run regular self-sustained HRD and training modules suitable to that park and its neighbouring area.

- An advertisement budget should be set aside to create awareness of these training programmes and their immense job potential. As of now, awareness is very low. For example, the Apparel Export Promotion Council and members of the Clothing Manufacturers Association of India of Mumbai were not aware of the existence of an apparel training course in the State Government Girls ITI and Regional Vocational Training Institute for Women in Dadar (Mumbai), itself. Similarly, potential trainees are not aware of the immense job opportunities in the textiles and clothing sector.
- The Processing sector has been neglected with regard to the HRD and training aspects by the industry and most institutions. Hence, immediate intervention by the Government in the HRD and training inputs in the processing sector is imperative. HRD intervention in both high and low-end processing can be successfully accompanied with minimum investment. Any further neglect will hamper India's edge in the globalised competitive scenario. Presently, this sector has the greatest potential for value addition to Indian textiles and clothing. Major Government intervention is required to create HRD and training infrastructure in the garment and apparel sector. Infrastructure in the area of Garmenting may also be created in the existing PSCs. This sector has the maximum job potential. The per-capita cost of training in the garment sector is very low.

9.1.1 Need to Create A Permanent Training Coordination-Cum- Monitoring Body

- As is well known, the value chain in the textiles sector is highly disaggregated. No single Organization or Body monitors or coordinates HRD and training across various sectors of the Textiles Industry. With increased globalisation and immensely expanding employment opportunities, and the consequent emphasis on skill-development, there is now a need for a centralised Body to coordinate & monitor these activities.

- It is important that the Ministry of Textiles invest a substantial sum annually to upgrade textiles and clothing training. Hence, the need arises to see that the money allocated by Government for HRD and training development for the industry is well spent. There should be a permanent coordinating-cum-monitoring Body which can also source funds for the textiles sector from other Ministries like Labour & Employment, Rural Development, as also State Governments.
- This Body would be in a position to channel skilled personnel in the respective manufacturing sectors in the textiles industry through institution-industry linkages.
- This Body will have the greater role to also meet the challenge to constantly develop course content in the textiles and garment sectors, and also suitably modify this, according to the needs of the industry.

9.1.2 Creation of New Group in the Office of the Textiles Commissioner

- A new wing can be created in Office of the Textiles Commissioner to service this coordination-cum-monitoring Body (without any new recruitment).
- The Body can be headed by Secretary (Textiles) and include
 1. Textiles Commissioner.
 2. Joint Secretary, Ministry of Textiles.
 3. Two or more selected Textiles Institutes, Government & Private from different geographical regions.
 4. Directorate General of Employment & Training, Ministry of Labour.
 5. Two or more Textiles Research Associations (TRAs).
 6. D.G., NIFT.
 7. Secretary General, AEPC (for ATDCs).
 8. Representatives of the State Governments (Technical Education).
 9. Jute Commissioner.
 10. A representative of the Machinery Manufacturing Association.
 11. A representative from Textiles Industry Associations.

9.1.3 Proposed interventions in higher education for the textiles sector

- Presently, there does not seem to be an immediate problem about the quantity of output. In any case, private institutions will increase intake, depending on demand.
- Nevertheless, a strong need has been expressed by the industry to standardise and update the curricula of training and educational institutions in the textiles sector.

9.1.4 Proposed interventions for ITIs

- There is a pressing need to increase the number of trades relating to the textiles sector.
- The number of ITIs targeted specifically at the textiles sector needs to be increased exponentially.
- It is important that a larger number of ITIs are identified to introduce textiles related trades.
- The Centres of Excellence (COE) scheme should be leveraged to increase the number of those ITIs that are either specifically targeted at the textiles sector, or those that include a substantial number of textiles related trades in their curriculum.
- ITIs situated near “catchment” areas for the textiles work force should immediately include textiles related trades in their regimen. If necessary, new ITIs should be set-up in those areas where, traditionally, workers migrate to places where the textiles industry is located. New ITIs under the COE scheme will have drawing power for these workers.

9.1.5 Intervention for Upgradation of Laboratories and Libraries at the Institute level

- Laboratories and libraries at the Institute level, etc., will require systematic upgradation.
 - Selected Institutions should be given financial assistance over a 5 year period to modernise their laboratories and libraries.
- There is also a need to facilitate a dialogue between Science and Home Science Colleges and the industry.

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ANNEXURE – I

Summary of the Information received from the Institutes

Sr No	Institute	Type Of Ownership	Type of Financing	Type of Infrastructure	Type of Faculty	Year of establishment	Course details				
							Level	Name of course	Total Intake	Duration	Affiliation
1	Nanjappa Polytechnic college, Coimbatore	Pvt.	Self-financing	Good	Good	1982	Diploma level	Diploma in Textile Technology (Approved by AICTE)	60	3.5 yrs	BTE, TN
2	Wool Research Association, Thane	Society (Linked to MOT)	Self-financing & Aide	Good	Good	1963	Skill up gradation	Carpet Manufacturing	10-15	7-15 days	-
								Spinning Process	10-15	7-15 days	-
								Textile Testing	10-15	7-15 days	-
								Wool Dyeing	10-15	7-15 days	-
								Computer Aided designing for Knit wear	10-15	7-15 days	-
								Processing of Specialty Fibers	10-15	7-15 days	-
								Customized training at customer location	10-15	7-15 days	-
							Certificate level	Dyeing and Finishing of Wool	30	1 yr	MSBTE
								Instrumental chemical Analysis	25	1 yr	-
								Colour Technology	20	3 months	--
								Computer aided textile designing	10	3 months	--
								Ecological and Instrumental Chemical Analysis	15	3 months	--
								Textile Testing and Quality Control	15	3 months	--
								Wool Textile Technology	10	3 months	--
Diploma level	LTM(Wool)	40	4 yrs	MSBTE							
	CAD	20	6 months	SNDT							

							Post graduate level	PG Diploma in Wool Textile Technology	20	1 yr	MSBTE
								PG Diploma in Ecological and Instrumental Chemical Analysis	20	1 yr	MSBTE
3	Bapuji Institute of Engg and Tech., Davangere, Karnataka	Pvt.	Self-financing	V.Good	Good	1979	Degree level	B. Tech. Textiles (Approved by AICTE)	40	4 yrs	Visvesvaraya Technological University
							Post graduate level	M. Tech. Textiles (Approved by AICTE)	18	2 yrs	Visvesvaraya Technological University
								B. Tech. in Textile Engg. (Approved by AICTE)	40	4 yrs	U.P.T.U, Luknow
								B. Tech. in Man Made Fibre Tech. (Approved by AICTE)	30	4 yrs	U.P.T.U, Luknow
								B. Tech. in Textile Chem. (Approved by AICTE)	20	4 yrs	U.P.T.U, Luknow
							Post graduate level	M. Tech. Textile Tech. (Approved by AICTE)	12	2 yrs	U.P.T.U, Luknow
								M. Tech. Textile Chem. (Approved by AICTE)	18	2 yrs	U.P.T.U, Lucknow
4	B. V. V. S. S. R. Vastrad Rural Polytechnic Guledgudd, Karnataka	Pvt.	Aided	Good	Good	1983	Diploma level	Diploma in Textiles (Approved by AICTE)	45	3 yrs	DTE, Bangalore
							Skill development training	Textile technician	40	2yrs	Directorate of vocational Education, Bangalore
								Diploma in Text Tech(MMFT) (Approved by AICTE)	35	3 yrs	BTE, Chennai

5	Sri Sowdambika Polytechnic College, Arppukottai, TN	Pvt.	Self-financing	Good	Good	1984	Certificate level	Fashion Designing	20	1 yr	TNOU, (Tamil Nadu Govt.)
							Diploma level	Diploma in Text Tech (Approved by AICTE)	60	3 yrs	DTE, Chennai
6	Sardar Vallabhbhai Patel Institute of Textile Management, Coimbatore, TN	Society (Linked to MOT)	Self-financing & Aided	Good	Very Good	2002	Post graduate level	PG Diploma in Text Mgt	40	2yrs	---
								PG Diploma in Apparel Mgt	40	1 yr	-
								PG Diploma in Home Text Mgt	40	1 yr	-
7	International Polytechnic for Women, New Delhi	Pvt.	Self-financing	Good	Good	1979	Diploma level	Textile Design (Approved by AICTE)	60	3 yrs	BTE, Delhi
								Fashion Designing (Approved by AICTE)	30	2 yrs	BTE, Delhi
8	Northern India Textile Research Association, Gaziabad	Society (Linked to MOT).	Aided	Good	Good	1975	Certificate level	Garment Tech and Mgt	40	1 yr	---
								Sewing m/c operator	120	2 months	--
9	DKTE Textile and Engg Institute, Ichalkaranji	Pvt.	Self-financing	Very Good	Very Good	1982	Diploma level	Diploma in Text Manufactures (Approved by AICTE)	60	4 yrs	MSBTE, Mumbai
								Diploma in Text Tech (Approved by AICTE)	30	4 yrs	MSBTE, Mumbai
							Degree level	B. Text in Text Tech (Approved by AICTE)	60	4 yrs	Shivaji University
								B. Text in Man Made Text Tech (Approved by AICTE)	30	4 yrs	Shivaji University
								B. Text in Text Plant Engg (Approved by AICTE)	30	4 yrs	Shivaji University
								B. Text. In Text Chem (Approved by AICTE)	60	4 yrs	Shivaji University
								B. Text in Fashion Tech (Approved by AICTE)	30	4 yrs	Shivaji University
Post graduate	M. Text in Text Tech (Approved by AICTE)	18	2 yrs	Shivaji University							

							level	M. Text in Text Chem (Approved by AICTE)	18	2 yrs	Shivaji University
							Diploma level	Dress Designing and Garment Mfrg (Approved by AICTE)	60	3 yrs	DTE, Mumbai
								Textile Designing	30	2 yrs	DTE, Mumbai
10	The Synthetic and Art Silk Mills' Research Aociation, Worli, Mumbai - 30	Society (Linked to MOT)	Self- financing and Aided	Very Good	Very Good	1950	Post graduate level	Post-graduate Diploma in Apparel Merchandising(PGDA M)	50	1 Months	MSBTE
								Post-graduate Diploma in Textile Chemical Processing Technology (PGDTCPT)	60	1 yr	Autonomous
							Diploma level	Diploma in Man-made Textile Technology (DMTT) (Approved by AICTE)	60	3 Years	AICTE/DTE
								Diploma in Man-made Textile Chemistry (DMTC) (Approved by AICTE)	60	3 Years	AICTE/DTE
								Diploma in Knitting Technology (DKT) (Approved by AICTE)	60	3 Years	AICTE/DTE
								Diploma in Fashion and Apparel Design Technology (DFADT)	60	11 Months	Autonomous
								Advance Diploma in Fashion and Apparel Design Technology (Full-time)	30	11 months	Autonomous
								Advance Diploma in Fashion and Apparel Design Technology (Part-time)	30	11 months	Autonomous

								Diploma in Fashion Designing	60	11 months	Autonomous
								Advance Diploma in Fashion Designing	30	11 months	Autonomous
								Diploma in Textile Colour and Design Technology	30	11 months	Autonomous
								Advance Diploma in Textile Colour and Design Technology	30	11 months	Autonomous
								Diploma in Textile Designing	60	11 months	Autonomous
								Advance Diploma in Textile Designing	60	11 months	Autonomous
								Diploma in Textile Chemical Processing Technology	30	11 months	Autonomous
								Diploma in Apparel Merchandising(DAM)	180	11 months	Autonomous
								Diploma in Export Import Management	60	6 months	IMC
								Diploma in Event and Brand Management	30		
							Certificate level	Weaving of Man-made Fibre Fabrics	60	1 yr	BVE
						Wet Processing of Man-made Textiles		60	1 yr	BVE	
						Computer Aided Textile Designing		100	1 month	Autonomous	
						Laundry Technology		30	3 months	Autonomous	
						Textiles and Garment Quality Assurance		30	30months	Autonomous	
						Advance course in Technical Textiles					

11	Ginni Devi Modi Girls(P.G.) college	Pvt.	Self-financing	Good	Good	1983	Ph.D.	Ph.D. (Home Science)		2 yrs	CCS University, Merut, UP
							Post graduate level	M.Sc. (Clothing and Textiles)	50	2 yrs	CCS University, Merut, UP
								M.A.(Home Science)	60	2 yrs	CCS University, Merut, UP
							Degree level	B.Sc.(Home Science)	60	3 yrs	CCS University, Merut, UP
12	P. A. C. Ramasamy Raja Polytechnic College, Rajapalayam, TN	Semi-Govt.	Self-financing and Aided	Good	Good	1963	Post Diploma level	Post Diploma in Knitting and Garment Technology	20	1.5 yrs	DTE/AICTE
							Diploma level	Diploma in Textile Technology	72	3 yrs	DTE/AICTE
								Diploma in Garment Technology	40	3 yrs	DTE/AICTE
13	Mangalore Institute of Fashion Technology, Mangalore	Pvt.	Self-financing	Good	Good	1996	Degree level	B.Sc. F.D.	30	3 yrs	Mangalore University
								B. Sc. G.D.	30	3 yrs	Mangalore University
							Diploma level	Diploma F.D.G.D.	30	2 yrs	--
							Graduation level	B. E. in Textile Technology	30	4 yrs	M.S.U, Baroda
								B. E. in Textile Engineering	30	4 yrs	M.S.U, Baroda
							Post graduate level	M.E. in Textiles Engineering		2 yrs	M.S.U, Baroda
M.E. in Man Made Textiles		2 yrs	M.S.U, Baroda								

14.	School of Fashion Technology , SECT Campus , Karve Nagar , Pune – 411 052	Pvt.	Self Financing	Good	Good	1999	Degree Level	B.H.Sc – Fashion Apparel Design	90	3 yrs	SNDT Women's University, Mumbai
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ANNEXURE-2

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered
1	A.L.T.Training College, Benglore	Net	Garment
2	Aditya Institute of Technology, New Delhi	Net	Garment
3	A.V.Parekh Technology Institute, Rajkot	Net	Garment
4	Annamalai Polytechnic, Chettinad	NCUTE	Textile
5	Anuradha Engg. College, Chikhali	NCUTE	Textile
6	Apeejay Institute of Design, New Delhi	Net	Garment
7	Arch Institute of Fashion & Design / Arch Gemology & Jewellery Institute, Jaipur	Net	Garment
8	Arya Bhatt Polytechnic, New Delhi	Net	Garment
9	Asian Polytechnic, New Delhi	Net	Garment
10	Avinashilingam Institute for Home Science & Higher Education for Women, Coimbatour	Net	Garment
11	Bannari Amman Inst of Tech, Sathyamangalm	NCUTE	Textile
12	B.R.Ambedkar Regional Engg. College, Jalandhar	Net	
13	Bapuji Institute of Engg. & Tech., Davangare	NCUTE	Textile
14	Bengal University/College, Howrah, WB	Net	
15	Bharathisadan Institute of Engg and Tech, Tiruchchirappalli,TN	Net	Textile
16	Bapuji Polytechnic, Davangere, Karnataka	NCUTE	Textile
17	C.U.Shah Polytechnic, Surendranagar	Net	Garment
18	Banasthali Vidyapith, Banasthali, Rajasthan		Garment
19	College of Textile Tech, Murshidabad, WB	Net	Textile
20	Centre for International Management, New Delhi	Net	Garment
21	College of Creative Arts , Pune	Net	Garment
22	College of Engg. & Technology, Akola	Net	Textile
23	College of Engg. & Technology, Nanded	Net	Textile
24	College of Engg, Tiruvananthapuram, Kerla	Net	Textile
25	College of Technology and Agriculture, Udaipur, Rajasthan	Net	Textile
26	College of Engg, Farmagudi, Goa	Net	Textile
27	D.K.T.E. Society's Textile & Engg. College, Ichalkaranji	NCUTE	Textile

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered	
28	Dayalbagh Educational Institute, Agra	Net		Garment
29	Dev Polytechnic for Women, Yamuna Nagar	Net		Garment
30	Dr. S & S. S. Gandhi College of Engineering & Technology SURAT - 395001	NCUTE	Textile	Garment
31	Dr S George Institute of Engg, Prakasam	Net		
32	Erode Institute of Chemical TechnologyVIJAYAMANGALAM	Net	Textile	
33	Erode Institute of Tech. KAVINDAMPADI - 638455 (T. N.)	NCUTE	Textile	
34	Erode Instituite of Chemical Tech, VijayaMangalam	NCUTE	Textile	
35	Essel Institute of Fashion Technology (IFFT)	Net		Garment
36	Faculty of Technology, Kochin University, Kerla	Net	Textile	
37	G.R.G. Polytechnic for Women Jolhipuram, Kuppepalayam COIMBATORE - 647044 (T. N.)	NCUTE	Textile	
38	Ginni Devi Modi Girls (P.G) College, Modinagar	Net	Textile	Garment
39	Gomathi Ammal Ploy, Tirunelvli	NCUTE	Textile	
40	H. K. E's Polytechnic, Raichur, Karnataka	NCUTE	Textile	
41	IEC School of Art & Fashion, New Delhi	Net		Garment
42	International Poly. For women, New Delhi	Net		Garment
43	Indian Institute of Crafts & Design, Jaipur	Net		Garment
44	Indian Institute of Design, Delhi	Net		Garment
45	Indian Institute of Technology (IIT), Guwahati	Net	Textile	
46	Institute of Technology, Gwalior, MP	Net	Textile	
47	Infopark School of Fashion, New Delhi	Net		Garment
48	Institute of Fashion Technology & Hotel Management, Gaziabad	Net		Garment
	8			
49	International Academy of Design, North Delhi	Net		Garment
50	International Academy of Design, South Delhi	Net		Garment
51	International Academy of Design, West Delhi	Net		Garment
52	International Academy of Design, East Delhi	Net		Garment
53	International Institute of Fashion Technology, New Delhi	Net		Garment
54	International Institute of Fashion Technology, East Delhi	Net		Garment
55	International Institute of Fashion Technology, North Delhi	Net		Garment
56	International Institute of Fashion Technology, West Delhi	Net		Garment

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered	
57	International Institute of Fashion Technology , Dehradun	Net		Garment
58	Institute of Technology, Vilaspur, MP	Net		Garment
59	International Institute of Fashion Technology , Patna	Net		Garment
60	International Institute of Fashion Technology, Gurgaon	Net		Garment
61	Janki Devi Vocational Centre, New Delhi	Net		Garment
62	Jawaharlal Darda Inst of Tech, Yawatmal	NCUTE	Textile	
63	JD Institute of Fashion Technology, New Delhi	Net		Garment
64	JD Institute of Fashion Technology, South Delhi	Net		Garment
65	JD Institute of Fashion Technology, North Delhi	Net		Garment
66	Jaya Engg College, Thirunianravur	NCUTE	Textile	
67	K.L. Nagaswamy Memorial Polytechnic, Madurai	Net	Textile	
68	Kalamkari Vocational Oriental Women's Polytechnic, Jammu	Net		Garment
69	Karavali College of Interior Decoration, Mangalore	Net		Garment
70	Kumaraguru College of Technology, Coimbatore	NCUTE	Textile	Garment
71	K S Ransamy college of Tech, Tiruchengode	NCUTE	Textile	
72	Latha Mathavan Polytechnic, Kidaripatti	NCUTE	Textile	
73	Lexicon School of Fashion , Chennai	Net		Garment
74	Lisa Institute of Fashions (P) Ltd., New Delhi	Net		Garment
75	Lisa Institute of Fashions (P) Ltd., South Delhi	Net		Garment
76	Lisa Institute of Fashions (P) Ltd., East Delhi	Net		Garment
77	Mangalore Institute of Fashion Technology, Manglore	Net		Garment
78	Maharanapratap College of Technology, Gwalior, MP	Net	Textile	
79	Murugesan Institute of Technology Karmapuram Village, Karipatti (P.O.) Attur Main Road, Salem	NCUTE	Textile	
80	Nachimuthu Polytechnic Makkinaickenpatti Post, Pollachi	NCUTE	Textile	
81	Nanjappa Institute of Technology Palanisame Ravi Nagar KarumathampattiCOIMBATORE	NCUTE	Textile	
82	Maharshi Dayanand Saraswati University, Ajmer	Net		Garment
83	Maharaja Sayajirao University of Baroda, Vododara			Garment
84	National Academy of Fashion Technology (NAFT), New Delhi	Net		Garment
85	National Institute of Fashion Design (NIFD), Delhi	Net		Garment
86	National Institute of Fashion Design (NIFD), Chandigargh	Net		Garment
87	National Institute of Fashion Design (NIFD), Faridabad	Net		Garment
88	National Institute of Fashion Design (NIFD), Gurgaon	Net		Garment

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered	
89	National Institute of Fashion Design (NIFD), Noida	Net		Garment
90	Nirmala Niketan College of Home Science & Polytechnic. Mumbai	Net		Garment
91	P.A .C. Ramaswamy Raja's Polytechnic, Rajapalayam	NCUTE	Textile	
92	Pasumpon Netaji Polytechnic MELANEELITHANALLUR	NCUTE	Textile	
93	Pearl Academy of Fashion, New Delhi	Net		Garment
94	Polytechnic for Women South Extension, New Delhi	Net		Garment
95	Rai University, Raipur	Net		Garment
103	RVS college of Engg and Tech, Dindigul	NCUTE	Textile	
104	RTE's Polytechnic, Hulkoti	NCUTE	Textile	
105	Rudraveni Muthuswamy Polytechnic COIMBATORE	NCUTE	Textile	
106	Rukmini Shamugam Poly., Salaiman	NCUTE	Textile	
	9			
107	S.C.S. Kothari Academy for Women, Chennai	Net		Garment
108	Shahu Chatrapati Plytechnic, Ichalkaranji		Textile	
109	B.V.V.S.S.R. Vastrad Rural Polytechnic Institute, Duledgudd, Karnataka	Net	Textile	
110	S.R.R.S. Govt. Polytechnic, Karimnagar, AP	Net	Textile	
111	Sarwajanik College of Engg. Technology, Surat	NCUTE	Textile	
112	Satyam Iternational Polytechnic for Women Institute of Fashion Technology	Net		Garment
113	Santilal Shah Engg College, Bhavnagar	Net	Textile	
114	School of Fashion Technology, Pune	Net		Garment
115	Senkunthar Institute of Polytechnic Kosavampalayam Kumaramangalam (P.O.) TIRUCHENGODE - 637205(T.N.)	NCUTE	Textile	
116	Senorita College of Fashion Design & Management	Net		Garment
117	Shri Maratha's Shahu Chhatrapati Polytechnic, Ichalkaranji	NCUTE	Textile	
118	Shri Vaishnav Polytechnic, Indore	NCUTE	Textile	
119	Shrishti School of Art Design & Technology, Banglore	Net		
120	Sir Bhavsinhji Polytechnic Institute Opp. Vidhya Nagar BHAVNAGAR - 364002 (Gujarat)	NCUTE	Textile	
121	SLN College of Engg, Raichur	NCUTE	Textile	

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered	
122	Sophia Shree B K Somani Memorial Polytechnic, Mumbai	Net		Garment
123	South Delhi Polytechnic for Women, New Delhi	Net	Textile	Garment
124	Sri Krishnarajendra Silver Jubilee Tech. Institute, Bangalore	Net	Textile	
125	S R Vastrad Rural Polytechnic Institute, Guledgudd, Karnatak	NCUTE	Textile	
126	Sri Ramakrishna Polytechnic Vattamalaipalayam NGGO Colony Post COIMBATORE	NCUTE	Textile	
127	Sri Sowdambika Polytechnic Chockalingapuram Dist. Kamarajar ARUPPUKOTAI - 626101 (T.N.)	NCUTE	Textile	
128	Shivaji Education Society's College of Engg. & Tech., Akola	NCUTE	Textile	
129	SSM Institute of Textile TechnologyKOMARAPALAYAM	Net		
130	Subramaniam Polytechnic RAYAVARAM	NCUTE	Textile	
131	Technological Institute of Textiles & Sciences, Bhivani	NCUTE	Textile	
132	The Karur Polytechnic, Karur	NCUTE	Textile	
133	Vidya Institute, Delhi	Net		Garment
134	VLB Janaki Ammal Polytechnic KovaipudurCOIMBATORE	NCUTE	Textile	
135	Wigan & Leigh India Ltd., Dehradun	Net		Garment
136	Wigan & Leigh India Ltd., Guahati	Net		Garment
137	Wigan & Leigh India Ltd., Indore	Net		Garment
138	Wigan & Leigh India Ltd., Kirti Nagar New Delhi	Net		Garment
139	Wigan & Leigh India Ltd., Kolkata	Net		Garment
140	Wigan & Leigh India Ltd., Mumbai	Net		Garment
141	Wigan & Leigh India Ltd., New Delhi	Net		Garment
142	Wigan & Leigh India Ltd., Paraganas	Net		Garment
143	Wigan & Leigh India Ltd.,Dickenson Rd Bangalore	Net		Garment
144	Wigan & Leigh India Ltd.,Reddy colony Bangalore	Net		Garment
145	YMCA Nizamuddin, New Delhi	Net	Textile	Garment
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Government Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered	
1	Alagappa College of Technology, Chennai	NCUTE	Textile	
2	Assam Textile Institute, Guwahati	NCUTE	Textile	Garment

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered	
3	Central Polytechnic, Thiruvananthapuram	NCUTE	Textile	
4	Central Technical Institute, Gwalior	NCUTE	Textile	
5	Govt College of Engg and Textile Technology, Behrampur, WB	NCUTE	Textile	
6	Govt College of Engg and Textile Technology, Serampore	NCUTE	Textile	
7	Department of Applied Chem and Tech, Amrutsar, Punjab	NCUTE	Textile	
8	Dr B. R. Ambedkar Regional Engg College, Jalandhar, Punjab	NCUTE	Textile	
9	Dr Babasaheb Ambedkar Govt Polyt, Ambota, HP	NCUTE	Textile	
10	Government Central Textile Institute, Kanpur	NCUTE	Textile	
11	Govt SKSJT Institute, Bangalore	NCUTE	Textile	
12	Govt College of Engg, Krishnagiri, TN	Net	Textile	
13	Govt. Inst. of Engg. & Tech., Hissar	NCUTE	Textile	
14	Govt. Inst. of Textile Chem. & Knitting Technology, Ludhiana	NCUTE	Textile	
15	Govt. Institute of Textile Tech., Bangalore	Net	Textile	
16	Govt. Institute of Textile Technology GUNTUR AP	NCUTE	Textile	Garment
17	Govt. Institute of Textile Technology Sircilla AP	NCUTE	Textile	
18	Govt. Polytechnic, Dahod	Net		Garment
19	Govt. Polytechnic for Girls, Surat	Net		
20	Govt. Polytechnic for Women, Guntur	Net		Garment
21	Govt. Polytechnic FURRUKHABAD (U.P.)	NCUTE	Textile	
22	Govt. Polytechnic, Barari, Bihar	NCUTE	Textile	
23	Govt. Polytechnic, Himmatnagar	Net		Garment
24	Govt. Polytechnic, Kannur	NCUTE	Textile	
25	Govt. Polytechnic, Kanpur	Net		
26	Govt. Polytechnic, Nagpur	NCUTE	Textile	
27	Govt. Polytechnic, Patna, Bihar	NCUTE	Textile	
28	Govt. Polytechnic, Sangrur	Net	Textile	
29	Govt. Polytechnic, Bhagalpur, Bihar	Net	Textile	
30	Govt. Polytechnic, Solapur	NCUTE	Textile	
31	Govt. Polytechnic, Trissur	NCUTE	Textile	
32	Govt. Polytechnic, Lehragaga	NCUTE	Textile	
33	G. Z. S. College of Engg & Tech, Bhatinda, Punjab	NCUTE	Textile	
34	Govt Women Polytechnic, New Delhi	Net		Garment
35	Indian Institute of Carpet Technology, Bhadohi, UP	NCUTE	Textile	
36	Institute of Text Tech, Choudwar, Orissa	NCUTE	Textile	

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered	
37	Indian Institute of Technology (IIT), Delhi	NCUTE	Textile	
38	University Institute of Chemical Technology, Mumbai	NCUTE	Textile	
39	Institute of Jute Technology, Kolkata	NCUTE	Textile	
40	Institute of Textile Technology Taramani, Chennai	NCUTE	Textile	
41	L.D. College of Engg., Ahmedabad	Net	Textile	
42	L.D.College of Engg.,Ahmedabad	NCUTE	Textile	
43	M.L.V. Textile Institute, Bhilwara	NCUTE	Textile	
44	M.S. University Dept. of Technology & Engg, Baroda	NCUTE	Textile	
45	National Institute of Fashion Technology (NIFT), Banglore	Net		Garment
46	National Institute of Fashion Technology (NIFT), Mumbai			Garment
47	National Institute of Fashion Technology (NIFT), Gandhinagar	Net		Garment
48	National Institute of Fashion Technology (NIFT), Kolkata	Net		Garment
49	National Institute of Fashion Technology (NIFT), Chennai	Net		Garment
50	National Institute of Fashion Technology (NIFT), Chandhigarh	Net		Garment
51	PSG PolytechnicCOIMBATORE - 641004 (T.N.)	NCUTE	Textile	
52	Punjab Institute of Textile Technology, Amritsar	NCUTE	Textile	
	11			
53	R.C. Technical Institute, Ahmedabad	NCUTE	Textile	
54	Punjab University, Patiala	Net		Garment
55	Punjab University, Chandhigarh	Net		Garment
56	Regional Vocational Training Institute (RVTI) for Women, Allahabad	Net		Garment
57	Regional Vocational Training Institute (RVTI) for Women, Banglore	Net		Garment
58	Regional Vocational Training Institute (RVTI) for Women, Hissar	Net		Garment
59	Regional Vocational Training Institute (RVTI) for Women, Indore	Net		Garment
60	Regional Vocational Training Institute (RVTI) for Women, Jaipur	Net		Garment
61	Regional Vocational Training Institute (RVTI) for Women, Mumbai	Net		Garment
62	Regional Vocational Training Institute (RVTI) for Women, Tura	Net		Garment
63	Sardar Vallabhbai Patel Institute of Textile Mgmt.Coimbatore	Net		Garment
64	SASMIRA - Institute of Man-Made Textiles, Mumbai	NCUTE	Textile	Garment

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered	
65	Shri Guru Gobind Singhji College of Engg. & Technology, Nanded	NCUTE	Textile	
66	Shivaji University, Kolhapur	Net		Garment
67	Sir J.J. School of Art, Mumbai	Net	Textile	
68	Small Industries Service Institute, New delhi	Net		Garment
69	SNDT Women's University, Mumbai	Net		Garment
70	SSM college of Engg, Komarapalayam	NCUTE	Textile	
71	Thiagarajar Polytechnic, Salem	NCUTE	Textile	
72	University college of Technology , Hyderabad	NCUTE	Textile	
73	Veermata Jijabai Technological Institute (VJTI), Mumbai	NCUTE	Textile	
74	University of Bombay, Mumbai	Net		Garment
75	Indian Institute of Handloom Technology, Varanasi	Directory	Textile	
76	Indian Institute of Handloom Technology, Salem	Directory	Textile	
77	Indian Institute of Handloom Technology, Guwahati	Directory	Textile	
78	Indian Institute of Handloom Technology, Jodhpur	Directory	Textile	
79	SPKM Indian Institute of Handloom Technology, Venkatgiri, AP	Directory	Textile	
80	Karnataka Handloom Tech. Institute, Gadag-Betageri	Directory	Textile	

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Government Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered	Govt/Non Govt	Levels at which the courses offered			
					Diploma	Degree	PG	
1	Alagappa College of Technology, Chennai	NCUTE	Textile	Govt		Degree	PG	
2	Assam Textile Institute, Guwahati	NCUTE	Textile	Govt	Diploma			
3	Central Polytechnic, Thiruvananthapuram	NCUTE	Textile	Govt	Diploma			
4	Central Technical Institute, Gwalior	NCUTE	Textile	Govt	Diploma			
5	Govt College of Engg and Textile Technology, Behrampur, WB	NCUTE	Textile	Govt		Degree		
6	Govt College of Engg and Textile Technology, Serampore	NCUTE	Textile	Govt		Degree	PG	
7	Department of Applied Chem and Tech, Amrutsar, Punjab	NCUTE	Textile	Govt		Degree		
8	Dr B. R. Ambedkar Regional Engg College, Jalandhar, Punjab	NCUTE	Textile	Govt		Degree		
9	Dr Babasaheb Ambedkar Govt Polytechnic, Ambota, HP	NCUTE	Textile	Govt	Diploma			
10	Government Central Textile Institute, Kanpur	NCUTE	Textile	Govt		Degree		

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered							
11	Govt SKSJT Institute, Bangalore	NCUTE	Textile		Govt	Diploma	Degree	PG		
12	Govt College of Engg, Krishnagri, TN	Net	Textile		Govt		Degree			
13	Govt. Inst. of Engg. & Tech., Hissar	NCUTE	Textile		Govt	Diploma				
14	Govt. Inst. of Textile Chem. & Knitting Technology, Ludhiana	NCUTE	Textile		Govt	Diploma				
15	Govt. Institute of Textile Tech., Bangalore	Net	Textile		Govt		Degree			
16	Govt. Institute of Textile Technology GUNTUR AP	NCUTE	Textile	Garment	Govt	Diploma				
17	Govt. Institute of Textile Technology Sircilla AP	NCUTE	Textile		Govt	Diploma				
18	Govt. Polytechnic , Dahod	Net		Garment	Govt	Diploma				
19	Govt. Polytechnic for Girls, Surat	Net			Govt	Diploma				
20	Govt. Polytechnic for Women, Guntur	Net		Garment	Govt	Diploma				
21	Govt. Polytechnic FURRUHABAD (U.P.)	NCUTE	Textile		Govt	Diploma				
22	Govt. Polytechnic, Barari, Bihar	NCUTE	Textile		Govt	Diploma				
23	Govt. Polytechnic, Himmatnagar	Net		Garment	Govt	Diploma				
24	Govt. Polytechnic, Kannur	NCUTE	Textile		Govt	Diploma				
25	Govt. Polytechnic, Kanpur	Net			Govt					
26	Govt. Polytechnic, Nagpur	NCUTE	Textile		Govt	Diploma				
27	Govt. Polytechnic, Patna , Bihar	NCUTE	Textile		Govt	Diploma				
28	Govt. Polytechnic, Sangrur	Net	Textile		Govt	Diploma				
29	Govt. Polytechnic, Bhagalpur, Bihar	Net	Textile		Govt	Diploma				
30	Govt. Polytechnic, Solapur	NCUTE	Textile		Govt	Diploma				
31	Govt. Polytechnic, Trissur	NCUTE	Textile		Govt	Diploma				
32	Govt. Polytechnic, Lehragaga	NCUTE	Textile		Govt	Diploma				
33	G. Z. S. College of Engg & Tech, Bhatinda, Punjab	NCUTE	Textile		Govt		Degree	PG		
		13								
34	Govt Women Polytechnic, New Delhi	Net		Garment	Govt	Diploma				
35	Indian Institute of Carpet Technology, Bhadohi, UP	NCUTE	Textile		Govt		Degree			
36	Institute of Text Tech, Choudwar, Orrisa	NCUTE	Textile		Govt	Diploma	Degree			
37	Indian Institute of Technology (IIT), Delhi	NCUTE	Textile		Govt		Degree	PG		
38	University Institute of Chemical Technology, Mumbai	NCUTE	Textile		Govt		Degree	PG		
39	Institute of Jute Technology, Kolkata	NCUTE	Textile		Govt		Degree			
40	Institute of Textile Technology Taramani, Chennai	NCUTE	Textile		Govt	Diploma				
41	L.D. College of Engg., Ahmedabad	Net	Textile		Govt		Degree			

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered							
42	L.D.College of Engg.,Ahmedabad	NCUTE	Textile		Govt		Degree			
43	M.L.V. Textile Institute, Bhilwara	NCUTE	Textile		Govt		Degree			
44	M.S. University Dept. of Technology & Engg, Baroda	NCUTE	Textile		Govt	Diploma	Degree	PG		
45	National Institute of Fashion Technology (NIFT), Banglore	Net		Garment	Govt	Diploma	Degree	PG		
46	National Institute of Fashion Technology (NIFT), Mumbai			Garment	Govt	Diploma				
47	National Institute of Fashion Technology (NIFT), Gandhinagar	Net		Garment	Govt	Diploma	Degree	PG		
48	National Institute of Fashion Technology (NIFT), Kolkota	Net		Garment	Govt	Diploma	Degree	PG		
49	National Institute of Fashion Technology (NIFT), Chennai	Net		Garment	Govt	Diploma	Degree	PG		
50	National Institute of Fashion Technology (NIFT), Chandhigarh	Net		Garment	Govt	Diploma	Degree	PG		
51	PSG PolytechnicCOIMBATORE - 641004 (T.N.)	NCUTE	Textile		Govt	Diploma	Degree	PG		
52	Punjab Institute of Textile Technology, Amritsar	NCUTE	Textile		Govt	Diploma				
53	R.C. Technical Institute, Ahmedabad	NCUTE	Textile		Govt	Diploma				
54	Punjab University, Patiala	Net		Garment	Govt	Diploma				
55	Punjab University, Chandhigarh	Net		Garment	Govt	Diploma			Certificate	
56	Regional Vocational Training Institute (RVTI) for Women, Allahabad	Net		Garment	Govt				Certificate	
57	Regional Vocational Training Institute (RVTI) for Women, Banglore	Net		Garment	Govt				Certificate	
58	Regional Vocational Training Institute (RVTI) for Women, Hisar	Net		Garment	Govt				Certificate	
59	Regional Vocational Training Institute (RVTI) for Women, Indore	Net		Garment	Govt				Certificate	
		14								
60	Regional Vocational Training Institute (RVTI) for Women, Jaipur	Net		Garment	Govt				Certificate	
61	Regional Vocational Training Institute (RVTI) for Women, Mumbai	Net		Garment	Govt				Certificate	
62	Regional Vocational Training Institute (RVTI) for Women, Tura	Net		Garment	Govt				Certificate	
63	Sardar Vallabhbbhai Patel Institute of Textile Mgmt.Coimbatore	Net		Garment	Govt			PG		

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered		Govt	Diploma	Degree	PG	Certificate
			Textile	Garment					
64	SASMIRA - Institute of Man-Made Textiles, Mumbai	NCUTE	Textile	Garment	Govt	Diploma		PG	Certificate
65	Shri Guru Gobind Singhji College of Engg. & Technology, Nanded	NCUTE	Textile		Govt		Degree		
66	Shivaji University, Kolhapur	Net		Garment	Govt		Degree		
67	Sir J.J. School of Art, Mumbai	Net	Textile		Govt		Degree		
68	Small Industries Service Institute, New delhi	Net		Garment	Govt				
69	SNDT Women's University, Mumbai	Net		Garment	Govt		Degree		
70	SSM college of Engg, Komarapalayam	NCUTE	Textile		govt	Diploma	Degree		
71	Thiagarajar Polytechnic, Salem	NCUTE	Textile		Govt	Diploma	Degree		
72	University college of Technology , Hyderabad	NCUTE	Textile		Govt		Degree		
73	Veermata Jijabai Technological Institute (VJTI), Mumbai	NCUTE	Textile		Govt	Diploma	Degree	PG	
74	University of Bombay, Mumbai	Net		Garment	Govt	Diploma			
75	Indian Institute of Handloom Technology, Varanasi	Directory	Textile		Govt	Diploma			
76	Indian Institute of Handloom Technology, Salem	Directory	Textile		Govt	Diploma			
77	Indian Institute of Handloom Technology, Guwahati	Directory	Textile		Govt	Diploma			
78	Indian Institute of Handloom Technology, Jodhpur	Directory	Textile		Govt	Diploma			
79	SPKM Indian Institute of Handloom Technology, Venkatgiri, AP	Directory	Textile		Govt	Diploma			
80	Karnataka Handloom Tech. Institute, Gadag-Betageri	Directory	Textile		Govt	Diploma			

15

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered	Govt/Non Govt	Levels at which courses offered					
					Diploma	Degree	PG	Certificate		
1	A.L.T.Training College, Benglore	Net		Garment	Non Govt	Diploma				
2	Aditya Institute of Technology, New Delhi	Net		Garment	Non Govt	Diploma				
3	A.V.Parekh Technology Institute, Rajkot	Net		Garment	Non Govt	Diploma				
4	Annamalai Polytechnic, Chettinad	NCUTE	Textile		Non Govt	Diploma				
5	Anuradha Engg. College, Chikhali	NCUTE	Textile		Non Govt		Degree			
6	Apeejay Institute of Design, New Delhi	Net		Garment	Non Govt	Diploma		PG	Certificate	
7	Arch Institute of Fashion & Design / Arch Gemology & Jewellery Institute, Jaipur	Net		Garment	Non Govt	Diploma	Degree		certificate	

Non Govt Institutes Offering Structured Courses in Textiles/Garmenting

Sr No	Institute Name	Source	Courses Offered						
127	Sri Sowdambika Polytechnic Chockalingapuram Dist. Kamarajar ARUPPUKKOTAI - 626101 (T.N.)	NCUTE	Textile		Non Govt	Diploma			
128	Shivaji Education Society's College of Engg. & Tech., Akola	NCUTE	Textile		Non Govt		Degree		
129	SSM Institute of Textile TechnologyKOMARAPALAYAM	Net			Non Govt				
130	Subramaniam Polytechnic RAYAVARAM	NCUTE	Textile		Non Govt	Diploma			
131	Technological Institute of Textiles & Sciences, Bhivani	NCUTE	Textile		Non Govt		Degree	PG	
132	The Karur Polytechnic, Karur	NCUTE	Textile		Non Govt	Diploma			
133	Vidya Institute, Delhi	Net		Garment	Non Govt	Diploma			
134	VLB Janaki Ammal Polytechnic KovaipudurCOIMBATORE	NCUTE	Textile		Non Govt	Diploma			
135	Wigan & Leigh India Ltd., Dehradun	Net		Garment	Non Govt	Diploma			
136	Wigan & Leigh India Ltd., Guahati	Net		Garment	Non Govt	Diploma			
137	Wigan & Leigh India Ltd., Indore	Net		Garment	Non Govt	Diploma			
138	Wigan & Leigh India Ltd., Kirti Nagar New Delhi	Net		Garment	Non Govt	Diploma			
139	Wigan & Leigh India Ltd., Kolkata	Net		Garment	Non Govt	Diploma			
140	Wigan & Leigh India Ltd., Mumbai	Net		Garment	Non Govt	Diploma			
141	Wigan & Leigh India Ltd., New Delhi	Net		Garment	Non Govt	Diploma			
142	Wigan & Leigh India Ltd., Paraganas	Net		Garment	Non Govt	Diploma			
143	Wigan & Leigh India Ltd.,Dickenson Rd Bangalore	Net		Garment	Non Govt	Diploma			
144	Wigan & Leigh India Ltd.,Reddy colony Bangalore	Net		Garment	Non Govt	Diploma			
145	YMCA Nizamuddin, New Delhi	Net	Textile	Garment	Non Govt	Diploma			

ANNEXURE – 3

I N D E X

S. No.	Particulars	Page Nos.
1.	Executive Summary	Page - 1
2.	List of AICTE approved Degree Colleges	Page-2
3.	State-wise Detail of Engineering Colleges offering Textile related Engineering Courses	Page-3
4.	State-wise details of diploma courses	Page – 6
5.	State-wise details of Industrial Training Institutes	Page – 7
6.	Trade Units and No. of ITIs	Page – 9
7.	No. of ITIs offering textile related Courses	Page – 12

EXECUTIVE SUMMARY

S. No.	Details	No.
1.	No. of AICTE approved Colleges, excluding IITs, offering Engineering Degrees	1346
	a) Yearly Intake	439689
2.	No. of Engineering Colleges, excluding IITs, offering Textile Engineering	39
	a) Yearly Intake	1816
3.	No. of Industrial Training Institutes (ITIs)	4047
	a) No. of Units	24848
	b) Yearly Intake	533952*
4.	No. of ITIs offering Textile Trade	1243
	a) No. of Units	1553
	b) Yearly Intake	33372*

* No. of Units x 16

AICTE APPROVED DEGREE COLLEGES

Region	State/Union Territory	ENGINEERING		Textiles Engineering	
		NOI	Intake	NOI	Intake
Central	1. Madhya Pradesh	61	20210	2	100
	2. Chhattisgarh	14	4020	--	--
	3. Gujarat	37	12965	3	140
	Total→	112	37195	5	240
Eastern	1. Mizoram	1	120	--	--
	2. Sikkim	1	525	--	--
	3. West Bengal	54	15477	3	90
	4. Tripura	1	180	--	--
	5. Meghalaya	1	240	--	--
	6. Arunachal Pradesh	1	210	--	--
	7. Andaman & Nicobar	--	--	--	--
	8. Assam	3	750	--	--
	9. Manipur	1	115	--	--
	10. Nagaland	--	--	--	--
	11. Orissa	41	13014	1	70
	12. Jharkhand	10	3385	--	--
	Total→	114	34016	4	160
North	1. Bihar	8	1905	1	70
	2. Uttar Pradesh	89	28953	2	150
	3. Uttaranchal	9	1440	--	--
	Total→	106	32298	3	220
North-West	1. Chandigarh	5	800	--	--
	2. Haryana	38	12785	1	110
	3. Himachal Pradesh	5	1260	--	--
	4. Jammu & Kashmir	5	1545	--	--
	5. New Delhi	14	4330	--	--
	6. Punjab	45	14880	3	90
	7. Rajasthan	41	15045	2	160
	Total→	153	50645	6	360
South	1. Andhra Pradesh	236	82970	1	20
	2. Pondicherry	6	2370	--	--
	3. Tamil Nadu	254	80417	9	430
	Total→	496	165757	10	450
South-West	1. Karnataka	118	46375	5	170
	2. Kerala	89	24413		
	Total→	207	70788	5	170
West	1. Maharashtra	155	48250	6	216
	2. Goa	3	740	--	--
	3. Daman & D.Dadra, N.H.	--	--	--	--
	Total→	158	48990	6	216
	Grand Total	1346	439689	39	1816

**STATE-WISE DETAILS OF ENGINEERING COLLEGES OFFERING
TEXTILE RELATED ENGINEERING COURSE**

Sr. No.	State	Subject	Intake
1.	<u>Madhya Pradesh</u> Jiwaji University, Gwalior (Govt.)	Textile Engineering	40
2.	Shri Vaishnav Institute of Technology and Science (Private)	Textile Technology	60
3.	<u>Gujarat</u> L.D. College of Engineering, Ahmedabad (Private)	Textile Technology	20
4.	M.S. University Faculty of Technology and Engineering, Vadodara (Govt.)	Textile Technology Textile Engineering	30 30
5.	Sarvjanik College of Engineering and Technology, Surat (Private)	Textile Production Textile Technology	30 30
6.	<u>West Bengal</u> College of Textile Technology, Murshidabad (Private)	Textile Technology	30
7.	College of Textile Technology, Hooghly (Govt.)	Textile Technology	30
8.	Institute of Jute Technology, Kolkata (State Govt.)	Jute & Fibre Technology	30
9.	<u>Orissa</u> Institute of Textile Technology, Cuttack (Govt.)	Textile Engineering Fashion Technology	40 30
10.	<u>Bihar</u> Bihar Institute of Textile Technology, Bihar (Govt.)	Silk Technology Silk Technology (condemned course) Textile Technology	20 30 20
11.	<u>Uttar Pradesh</u> Govt. Central Textile Institute, Kanpur (Govt.)	Manmade Fibre Technology Textile Chemistry Textile Technology Textile Engineering	30 20 40 40

12.	Indian Institute of Carpet Technology, Bhadoi (Govt.)	Carpet & Textile Technology	20
13.	<u>Haryana</u> Technology Institute of Textile & Science, Bhiwani (Private)	Textile Chemistry & Textile Technology Fashion & Apparel Engineering	80 30
14.	<u>Punjab</u> National Institute of Technology, Jalandhar (Govt.)	Textile Technology	40
15.	Giani Zail Singh College of Engineering & Technology, Bhatinda (Govt.)	Textile Engineering	30
16.	Guru Nanak Dev University, Amritsar (Govt.)	Textile Chemistry	20
17.	<u>Rajasthan</u> Lakshmi Devi Institute of Engineering & Technology, Chikani (Private)	Fashion Technology	60
18.	M.L.V Textile Institute, Pratap Nagar (Govt.)	Textile Chemistry Textile Engineering Textile Technology	20 20 60
19.	<u>Andhra Pradesh</u> Osmania University (Govt.)	Textile Technology	20
20.	<u>Tamil Nadu</u> Alagappa College of Technology, Anna University (Govt.)	Textile Technology	40
21.	Bennavi Amman Institute of Technology, Coimbatore (Private)	Textile Technology Fashion Technology	40 30
22.	Jaya Engineering College, Tiruvallur District (Private)	Textile Technology	40
23.	K.S. Rangaswamy College of Technology, Nammakal District (Private)	Textile Technology	30
24.	Kumarjuru College of Technology, Coimbatore (Private)	Fashion Technology Textile Technology	40 60

25.	PSG College of Technology, Coimbatore (Grant-in-aid Institute)	Textile Technology	30
26.	Pavendra Bhartidaran College of Engineering, Tridrapalli District (Private)	Textile Technology	30
27.	Ratnarel Subramaniam College of Engineering & Technology, Dindejuli District (Private)	Textile Technology	30
28.	SSM College of Engineering, Komarapalayam, Namappal District (Private)	Textile Technology Textile Technology (Textile Chemistry)	30 30
29.	<u>Karnataka</u> Bapuji Institute of Engineering & Technology	Textile Technology	40
30.	S.K.S.I.T. Institute, Bangalore (Govt.)	Textile Technology Silk Technology	30 20
31.	H Ke'sh College of Engineering, Raichor (Private)	Textile Technology	30
32.	Rural College of Engineering & Technology (Private)	Textile Technology	30
33.	S.K.S.T. Institute (Evening), Bangalore (Govt.)	Textile Engineering	20
34.	<u>Maharashtra</u> Jawaharlal Darda Institute of Engineering, Gandhi Bhawan (Private)	Textile Engineering	30
35.	Paramhans Ramkrishna Monitebaba Sansthan, Buldhana (Private)	Textile Engineering	60
36.	Shri Guru Gobind Singhji College of Engineering & Technology (Private)	Textile Technology	30
37.	Shri Shivaji Education Society, Aman Valley's College of Engineering (Private)	Textile Technology	60
38.	University Department of Chemical Technology, Mumbai (Govt.)	Technology of Intermediates & Dyes	16
39.	VJTI, Mumbai (Govt.)	Textile Engineering	20

Region	State/Union Territory	DIPLOMA							
		ENGINEERING		PHARMACY		HMCT		ARCHITECTURE	
		NOI	Intake	NOI	Intake	NOI	Intake	NOI	Intake
Central	1. Madhya Pradesh	49	9094	27	1520	-	-	-	-
	2. Chhattisgarh	10	1710	01	30	-	-	-	-
	3. Gujarat	42	12937	09	570	-	-	1	40
	Total ----->	101	23741	37	2120	-	-	1	40
Eastern	1. Mizoram	04	480	01	150	-	-	-	-
	2. Sikkim	04	390	01	60	01	60	-	-
	3. West Bengal	57	8725	03	160	10	780	-	-
	4. Tripura	03	440	01	60	-	-	-	-
	5. Meghalaya	03	440	-	-	-	-	-	-
	6. Arunachal Pradesh	02	320	-	-	01	20	-	-
	7. Andaman & Nicobar	02	245	-	-	01	20	-	-
	8. Assam	13	1803	02	150	-	-	-	-
	9. Manipur	03	285	-	-	-	-	-	-
	10. Nagaland	03	285	-	-	-	-	-	-
	11. Orissa	31	6495	14	740	01	60	-	-
	12. Jharkhand	21	2997	02	150	01	45	-	-
	Total ----->	146	22905	24	1470	15	985	-	-
North	1. Bihar	13	2745	-	-	02	180	-	-
	2. Uttar Pradesh	87	10691	09	430	03	270	-	-
	3. Uttranchal	17	2253	13	570	03	140	-	-
	Total ----->	117	15689	19	740	8	590	-	-
North-West	1. Chandigarh	3	555	02	100	-	-	2	60
	2. Haryana	24	7460	16	955	-	-	3	160
	3. Himachal Pradesh	7	1215	02	80	-	-	2	45
	4. Jammu & Kashmir	12	2730	01	40	-	-	6	210
	5. New Delhi	15	3841	04	220	-	-	4	140
	6. Punjab	48	12450	17	1020	-	-	5	170
	7. Rajasthan	21	1955	17	969	-	-	1	20
	Total ----->	130	30206	59	3384	-	-	23	805
South	1. Andhra Pradesh	100	19645	49	2720	6	290	-	-
	2. Pondicherry	5	890	01	20	1	20	-	-
	3. Tamil Nadu	210	59140	15	1170	13	810	-	-
	Total ----->	315	79675	65	3910	20	1120	-	-
South-West	1. Karnataka	205	38885	88	5100	-	-	-	-
	2. Kerala	49	9715	17	1015	4	300	-	-
	Total ----->	254	48600	105	6115	4	300	-	-
West	1. Maharashtra	172	43230	105	6280	19	1185	1	60
	2. Goa	7	1100	01	10	2	120	-	-
	3. Daman & D, Dadar, N.H.	2	270	-	-	-	-	-	-
	Total ----->	181	44600	106	6290	21	1305	1	60
Grand Total	1244	265416	415	24029	63	4020	25	905	

Directorate General of Employment & Training
State & No. of Affiliated ITIs
All Trades

Sl. No.	State/UT	No. of Affiliated ITIs						
		Total	Government			Private		
			General	Women	Others	General	Women	Others
1.	Andaman and Nicobar Island	3	1	0	0	0	0	2
2.	Andhra Pradesh	560	60	20	0	466	4	10
3.	Arunachal Pradesh	2	2	0	0	0	0	0
4.	Assam	25	21	2	0	2	0	0
5.	Bihar	44	21	1	0	19	0	3
6.	Chandigarh	2	1	1	0	0	0	0
7.	Chhatisgarh	53	14	7	0	32	0	0
8.	Daman and Diu	2	2	0	0	0	0	0
9.	Delhi	56	4	3	7	12	23	7
10.	Dadra and Nagar Haweli	1	1	0	0	0	0	0
11.	Goa	14	10	0	0	3	0	1
12.	Gujarat	221	127	2	3	85	3	1
13.	Himachal Pradesh	44	26	16	0	2	0	0
14.	Haryana	106	37	37	2	17	9	4
15.	Jharkhand	20	9	1	0	9	0	1
16.	Jammu and Kashmir	42	37	2	3	0	0	0
17.	Kerala	469	36	8	15	393	4	13
18.	Karnataka	260	31	6	0	207	9	7
19.	Lakshadweep	1	1	0	0	0	0	0
20.	Meghalaya	5	3	1	0	1	0	0
21.	Maharashtra	622	334	14	0	264	10	0
22.	Manipur	4	4	0	0	0	0	0
23.	Madhya Pradesh	100	64	11	1	23	1	0
24.	Mizoram	1	1	0	0	0	0	0
25.	Nagaland	3	3	0	0	0	0	0
26.	Orissa	189	18	8	1	148	6	8
27.	Punjab	129	47	47	0	27	8	0
28.	Pondicherry	11	3	2	0	6	0	0
29.	Rajasthan	129	85	8	7	22	2	5
30.	Sikkim	1	1	0	0	0	0	0

31.	Tamil Nadu	534	36	5	0	487	6	0
32.	Tripura	4	3	1	0	0	0	0
33.	Uttanchal	77	39	5	8	24	0	1
34.	Uttar Pradesh	248	75	35	1	129	8	0
35.	West Bengal	65	21	1	0	38	3	2
Total		4047	1178	244	48	2416	96	65

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

**Directorate General of Employment & Training
Trade Units & No. of ITIs (All India)**

Sl. No.	Trade	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Architectural Assistant	1	0	1
2.	Attendant Operator (Chemical Plant)	29	14	3
3.	Baker & Confectioner	40	39	0
4.	Bleaching Dyeing & Calico Printing	49	46	1
5.	Book Binder	36	26	6
6.	Cutting and Tailoring renamad as Cutting and Sewing	935	460	237
7.	Mechanic Computer Hardware	2	0	1
8.	Computer Operator and Programming Assistant	626	113	254
9.	Carpenter	420	317	40
10.	Cane, Willow and Bamboo Work	2	0	1
11.	Dress Making	305	228	46
12.	Draughtsman (Mechanical)	754	219	196
13.	Data Preparation and Computer Software	58	7	28
14.	Draughtsman (Civil)	1527	308	481
15.	Desk Top Publishing Operator	36	11	13
16.	Electrician	5326	752	1322
17.	Electroplater	31	20	1
18.	Electronics Mechanic	1669	422	471
19.	Embroidery & Needle Work	248	176	34
20.	Foundaryman	218	134	5
21.	Forger & Heat Treater	123	99	7
22.	Fitter	6100	867	1425
23.	Hand Compositor	13	8	2
24.	Hair & Skin Carer	105	78	20
25.	Hand Weaving of Niwar Tape, Durries and Carpets	1	1	0
26.	Instrument Mechanic (Chemical Plant)	27	13	3
27.	Instrument Mechanic (Chemical Plant)	1	1	0
28.	Instrument Mechanic	106	40	8
29.	Information Technology & Electronics System Maint.	32	10	9
30.	Knitting With Machine	3	3	0

31.	Laboratory Assistant (Chemical Plant)	21	5	5
32.	Laboratory Assistant (Chemical Plant)	5	1	0
33.	Leather Goods Maker	18	9	5
34.	Litho Offset Machine Minder	1	0	1
35.	Letter Press Machine Minder	8	5	1
36.	Mechanic Agricultural Machinery	24	18	1
37.	Mason (Building Constructor)	152	81	30
38.	Mechanic (Diesel)	1349	321	440
39.	Mechanic Consumer Electronics	2	0	1
40.	Machinist (Grinder)	184	75	7
41.	Machinist	1044	301	41
42.	Mechanic (Tractor)	253	170	10
43.	Mechanic (Instrument Aircraft)	158	73	17
44.	Moulder	12	9	0
45.	Mechanic Maintenance (Chemical Plant)	12	4	3
46.	Millwright Maintenance Mechanic	10	6	0
47.	Mechanic (Motor Vehicle)	1835	495	431
48.	Manufacture of Footwear	8	6	2
49.	Mechanic (Refrigeration and Air Conditioning)	561	177	127
50.	Mechanic Radio and Television	946	392	163
51.	Medical Transcription	6	0	1
52.	Mechanic Watch and Clock	29	18	1
53.	Mechanic Machine Tool Maintenance	69	36	4
54.	Phototype Setter and Desktop Operator	1	1	0
55.	Preservation of Fruit & Vegetables	100	92	3
56.	Photographer	12	7	4
57.	Plumber	375	196	113
58.	Pump Operator-Cum-Mechanic	47	43	1
59.	Plastic Mould Maker	2	2	0
60.	Pump Mechanic	31	29	0
61.	Painter (General)	149	104	13
62.	Plastic Processing Operator	106	64	6
63.	Pattern Maker	71	59	1
64.	Refrigeration & Air Conditioning Mechanic	48	27	7
65.	Secretarial Practice	141	76	41
66.	Sheet Metal Worker	285	187	31
67.	Stenography Regional Language	1	0	1

68.	Surveyor	239	120	34
69.	Stenography (English)	619	258	154
70.	Stenography (Hindi)	369	217	62
71.	Tool & Die Maker (Dies & Moulds)	8	5	0
72.	Tool & Die Maker (Press Tools, Jig & Fixture)	37	18	2
73.	Tool & Die Maker	38	17	3
74.	Turner	1592	394	137
75.	Upholsterer	3	3	0
76.	Upholster	2	2	0
77.	Watch and Clock Maker	5	4	0
78.	Welder (Gas & Electric)	1801	669	409
79.	Welder	106	50	33
80.	Wireless Mechanic cum Ope	19	15	1
81.	Wireman	1628	603	257
82.	Weaving of Skill & Wollen Fabrics.	3	2	0
83.	Weaving of Woollen Fabrics.	4	4	0
	Total	33372	-	-

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

**No. of Industrial Training Institutes offering
Textile Related Courses**

Sl.No.	Trade	No. of Units	No. of I.T.I.s	
			Government	Private
1.	Bleaching Dyeing & Calico Printing	49	46	1
2.	Cutting and Tailoring renamed as Cutting and Sewing	935	460	237
3.	Dress Making	305	228	46
4.	Embroidery & Needle Work	248	176	34
5.	Hand Weaving of Niwar Tape, Durries and Carpets	1	1	0
6.	Knitting with Machine	3	3	0
7.	Upholsterer	3	3	0
8.	Upholster	2	2	0
9.	Weaving of Silk & Woolen Fabrics	3	2	0
10.	Weaving of Woolen Fabrics	4	4	0
	Total	1553	925	318

Total ITIs = 1243

No. of Units = 1553

Intake = 24848

**Directorate General of Employment & Training
State Trade Units & No. of ITIs
Bleaching Dyeing & Calico Printing**

Sl. No.	State/UT	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Chhatisgarh	1	1	0
2.	Himachal Pradesh	1	1	0
3.	Haryana	1	1	0
4.	Jammu and Kashmir	1	1	0
5.	Maharashtra	4	2	0
6.	Punjab	40	40	0
7.	Uttar Pradesh	1	0	1
Total		49	46	1

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

Directorate General of Employment & Training
State Trade Units & No. of ITIs
Cutting and Tailoring renamed as Cutting and Sewing

Sl. No.	State/UT	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Andhra Pradesh	40	12	19
2.	Assam	16	11	0
3.	Bihar	4	2	1
4.	Chandigarh	6	2	0
5.	Chhatisgarh	7	7	0
6.	Daman and Diu	2	2	0
7.	Delhi	92	13	31
8.	Goa	5	4	0
9.	Gujarat	21	10	5
10.	Himachal Pradesh	25	23	0
11.	Haryana	91	45	21
12.	Jharkhand	1	1	0
13.	Jammu and Kashmir	33	27	0
14.	Kerala	15	1	10
15.	Karnataka	52	4	38
16.	Lakshadweep	1	1	0
17.	Meghalaya	1	0	1
18.	Maharashtra	118	91	5
19.	Madhya Pradesh	36	26	5
20.	Mizoram	1	1	0
21.	Nagaland	2	2	0
22.	Orissa	43	6	26
23.	Punjab	92	60	12
24.	Pondicherry	2	2	0
25.	Rajasthan	30	25	4
26.	Tamil Nadu	33	2	20
27.	Uttranchal	33	23	1
28.	Uttar Pradesh	118	50	35
29.	West Bengal	15	7	3
Total		935	460	237

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

Directorate General of Employment & Training
State Trade Units & No. of ITIs
Dress Making

Sl. No.	State/UT	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Andhra Pradesh	13	11	1
2.	Assam	6	6	0
3.	Chandigarh	1	1	0
4.	Chhatisgarh	1	1	0
5.	Gujarat	41	18	9
6.	Himachal Pradesh	4	4	0
7.	Haryana	5	4	0
8.	Kerala	8	3	4
9.	Karnataka	3	1	2
10.	Meghalaya	1	1	0
11.	Maharashtra	173	156	12
12.	Madhya Pradesh	6	3	1
13.	Orissa	2	2	0
14.	Punjab	17	4	9
15.	Rajasthan	9	9	0
16.	Tamil Nadu	5	1	3
17.	Tripura	1	1	0
18.	Uttar Pradesh	6	1	4
19.	West Bengal	3	1	1
Total		305	228	46

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

**Directorate General of Employment & Training
State Trade Units & No. of ITIs
Embroidery & Needle Work**

Sl. No.	State/UT	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Andhra Pradesh	2	0	1
2.	Assam	4	4	0
3.	Chandigarh	2	1	0
4.	Delhi	13	5	3
5.	Gujarat	2	0	2
6.	Himachal Pradesh	18	15	0
7.	Haryana	56	34	12
8.	Jharkhand	1	1	0
9.	Karnataka	1	0	1
10.	Maharashtra	30	27	1
11.	Madhya Pradesh	4	3	0
12.	Punjab	76	56	9
13.	Rajasthan	2	2	0
14.	Tamil Nadu	7	1	4
15.	Uttanchal	3	3	0
16.	Uttar Pradesh	27	24	1
Total		248	176	34

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

**Directorate General of Employment & Training
State Trade Units & No. of ITIs
Knitting With Machine**

Sl. No.	State/UT	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Assam	1	1	0
2.	Maharashtra	2	2	0
Total		3	3	0

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

Directorate General of Employment & Training
State Trade Units & No. of ITIs
Hand Weaving of Niwar Tape, Durries and Carpets

Sl. No.	State/UT	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Jammu and Kashmir	1	1	0
Total		1	1	0

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

**Directorate General of Employment & Training
State Trade Units & No. of ITIs
Upholsterer**

Sl. No.	State/UT	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Himachal Pradesh	1	1	0
2.	Kerala	1	1	0
3.	Uttar Pradesh	1	1	0
Total		3	3	0

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

Directorate General of Employment & Training
State Trade Units & No. of ITIs
Upholster

Sl. No.	State/UT	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Assam	1	1	0
2.	Kerala	1	1	0
Total		2	2	0

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

**Directorate General of Employment & Training
State Trade Units & No. of ITIs
Weaving of Skill & Wollen Fabrics.**

Sl. No.	State/UT	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Orissa	2	1	0
2.	Uttanchal	1	1	0
Total		3	2	0

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

**Directorate General of Employment & Training
State Trade Units & No. of ITIs
Weaving of Woollen Fabrics.**

Sl. No.	State/UT	No. of Units	No. of I.T.I.'s	
			Government	Private
1.	Bihar	1	1	0
2.	Himachal Pradesh	2	2	0
3.	Uttranchal	1	1	0
Total		4	4	0

Note

1. Trade Units comprises of 20, 16, 12 trainees depending upon the Trade
2. The information given above may be taken as provisional. For confirmation, contact the State Directorate.

ANNEXURE - 4

Institutes offering Textile Training & Education **(Other than Degree/Diploma Colleges)**

1. Textile Research Association (TRAs)

- 1) Ahmedabad Textile Industries' Research Association (ATIRA), Ahmedabad
- 2) Bombay Textile Research Association (BTRA), Mumbai
- 3) Indian Jute Industries' Research Association (IJIRA), Kolkata
- 4) Man-made Textile Research Association (MANTRA), Surat
- 5) North Indian Textile Research Association (NITRA), Gaziabad
- 6) South India Textile Research Association (SITRA), Coimbatore
- 7) Synthetic & Art Silk Mills' Research Association (SASMIRA),
- 8) Wool Research Association (WRA), Thane.

2. Powerloom Service Centres (PSCs)

- 1) Powerloom Service Centre, Canal Road, Jammu (J&K)
- 2) Powerloom Service Centre, 2/118, A- Jaganathpuram Colony, Erode (T.N.)
- 3) Powerloom Service Centre, I.T.T. Building, Choudwar, Cuttack, (Orissa)
- 4) Powerloom Service Centre, 9, Industrial Estate, Burhanpur, (M.P.)
- 5) Powerloom Service Centre, Govind Bhavan, P.O. Bundiadganj, Manpur, Gaya, (Bihar)
- 6) Powerloom Service Centre, Buntex Bldg. Compound, Chheharta, Amritsar, (Pb).
- 7) Powerloom Service Centre, Roopnagarh Road, Madanganj Kishangarh (Rajasthan)
- 8) Powerloom Service Centre, Shed No.C-51 & C-52, Indl. Estate, Belgaun (Karnataka)
- 9) Powerloom Service Centre, Nizamuddinpura, Maunath Bhanjan, Dist. Azamgarh (U.P.)
- 10) Powerloom Service Centre, Arnattukara Village, Trissur Taluka, Dist. Trissur(Kerala).
- 11) Office of the Textile Commissioner, Milipara, P.O. Ranaghat, Dist. Nadia (W.B.)
- 12) Powerloom Service Centre, 407-410, G.I.D.C., A.K. Road, Surat, Katargam (Guj.)
- 13) Powerloom Service, Ind. Ass. Comp. Kidwai Road, Malegaon, Nasik, (Mah.)
- 14) ATIRA Powerloom Service Centre, P.O. Ambawadi Vistar, Ahmedabad
- 15) BTRA Powerloom Service Centre, 5/E/2, M.I.D.C. Akkalkot Road, Solapur
- 16) BTRA Powerloom Service Centre, 18/231, Ind. Estate, Ichalkaranji, Kolhapur (Mah)
- 17) BTRA Powerloom Service Centre, Via (MHA) 408 Somwar Peth, Madhavnagar (Mah)
- 18) MANTRA Powerloom Service Centre, S.T. Road, Dolka, Dist. Ahmedabad (Guj).

- 19) MANTRA Powerloom Service Centre, Udyog Bharti School, G.I.D.C., Pandesara, Surat
- 20) MANTRA Powerloom Service Centre, G.I.D.C. Road No.3, Sachin, Dist. Surat
- 21) NITRA Powerloom Service Centre, Maqbra Road, Quaiser Ganj, Meerut (U.P.)
- 22) NITRA Powerloom Service Centre, Chhajiapur, Dist. Ambedkar Nagar, Tanda (U.P.)
- 23) NITRA Powerloom Service Centre, Indl. Estate, Bamuni Maidan, Guwahati (Assam)
- 24) NITRA Powerloom Service Centre, 6056/3, Hargovind Mandir, Ludhiana (Pb.)
- 25) NITRA Powerloom Service Centre, Ramgarh Road, Dist. Ambedkar Nagar, Jabalpur
- 26) NITRA Powerloom Service Centre, 222-B, Shyam Nagar, Sujat Ganj, Kanpur
- 27) NITRA Powerloom Service Centre, E-13, Indl. Area, Panipat (Haryana)
- 28) NITRA Powerloom Service Centre, G-20, B.T. Suiting Pan Road, Bhilwara (Raj)
- 29) NITRA Powerloom Service Centre, Sahakar Road, Jaipur (Raj.)
- 30) SASMIRA Powerloom Service Centre, 319, Silco House, Bhiwandi, Dist. Thane
- 31) SASMIRA Powerloom Service Centre, 349, Sammad Nagar, Bhiwqandi, Dist. Thane
- 32) SITRA Powerloom Service Centre, 51/A, Lakshmipuram, Sankarankovil (T.N.)
- 33) SITRA Powerloom Service Centre, 5/142, S.V. Koli St. Pudupet, Nagari (A.P.)
- 34) SITRA Powerloom Service Centre, 4, Raghavendra Road, Komarapalayam (T.N.)
- 35) SITRA Powerloom Service Centre, Taluk Office Roaf, Dodbballpur, Karnataka
- 36) SITRA Powerloom Service Centre, Manickapuram Road, Palladam (T.N.)
- 37) SITRA Powerloom Service Centre, 1/1 Sanarpalayam Road, Tiruchengode (T.N.)
- 38) SITRA Powerloom Service Centre, K.S.S.I.D.C., B-90/Ind. Estate, Bangalore (Kar.)
- 39) SITRA Powerloom Service Centre, Shed No.5&6, Narasapur, Gadag, Betagiri (Kar.)
- 40) SITRA Powerloom Service Centre, J.K.K. Nataraja Nilayam, Gugal, Salem (T.N.)
- 41) SITRA Powerloom Service Centre, Ganeshpuram, Somanur (T.N.)
- 42) SITRA Powerloom Service Centre, 40/D, Rajlinapuram (E), Karur (T.N.)
- 43) SITRA Powerloom Service Centre, Dist. Ind. Compound, Musheerabad, Hyderabad (A.P.)
- 44) SITRA Powerloom Service Centre, 412/2, Itwara, Burhnpur (M.P.)

3. **Indian Institute of Handloom Technology (IITH)**

- 1) Indian Institute of Handloom Technology, Varnasi
- 2) Indian Institute of Handloom Technology, Guhawati
- 3) Indian Institute of Handloom Technology, Salem
- 4) Indian Institute of Handloom Technology, Jodhpur
- 5) Indian Institute of Handloom Technology, Venkatgiri
- 6) Indian Institute of Handloom Technology, Gadag

4. **Weaver's Service Centres (WSC)**

- 1) Weaver's Service Centre, Weaver's Colony, Bharat Nagar, New Delhi (New Delhi)
- 2) Weaver's Service Centre, 162/2, Dayal Vatik Compound, Garh Road, Gandhi Nagar, Meerut
- 3) Weaver's Service Centre, Assandh Road, Kacha Camp, Panipat (Haryana)
- 4) Weaver's Service Centre, Upper Chamoli, Garhwal (Uttaranchal)
- 5) Weaver's Service Centre, Chowkaghat, Varanasi (U.P.)
- 6) Weaver's Service Centre, Kanchangarh Barari, Bhagalpur, (Bihar)
- 7) Weaver's Service Centre, Pubsuraunie Road, Behind Manipur House, (Guwahati (Assam))
- 8) Weaver's Service Centre, Industrial Estate, Takyelpet, Nanipur, Imphal (Manipur)
- 9) Weaver's Service Centre, Gorkhabasti, P.O. Kathal Bagar, Agartala (Tripura)
- 10) Weaver's Service Centre, 21, Chittaranjan Avenue, Kolkata (W.B.)
- 11) Weaver's Service Centre, Bunkar Bhawan, Maharishi College Road, Bhubaneswar (Orissa)
- 12) Weaver's Service Centre, Chenatha Bhawan, Nampalli, Hyderabad (A.P.)
- 13) Weaver's Service Centre, Foulke Compound, Thillai Nagar, Salem (T.N.)
- 14) Weaver's Service Centre, C-1-B, Rajaji Bhawan, Basant Nagar, Chennai (T.N.)
- 15) Weaver's Service Centre, 20, Railway Road, Kancheepuram (T.N.)
- 16) Weaver's Service Centre, Madena complex, South Bazar, Cannore (Kerala)
- 17) Weaver's Service Centre, No.2 & 4, 2nd Main Road, Okalipuram Bangalore (Kar.)
- 18) Weaver's Service Centre, 15-A, Mama Parmanand Marg, Mumbai (Mah.)
- 19) Weaver's Service Centre, Premier Shopping Centre, 4th Floor, Near Judicial Complex, Mirzapur Road, Ahmedabad (Gujarat)
- 20) Weaver's Service Centre, 1st Floor, New Secretariat Building, Civil Lines, Nagpur (Mah.)
- 21) Weaver's Service Centre, Apco Building, Governorpet, Vijayawada (A.P.)
- 22) Weaver's Service Centre, Kamdhenu Commercial Complex, Ajmer Road, Jaipur (Raj.)
- 23) Weaver's Service Centre, 3rd Floor, Sunalia Bhawan, Sattigudi Chowk, Raigarh
- 24) Weaver's Service Centre, F-4, Industrial Estate, Indore (M.P.)

5. Apparel Training & Design Centres (ATDCs)

- 1) ATDC, Chennai
- 2) ATDC, Hyderabad
- 3) ATDC, Kolkata
- 4) ATDC, New Delhi
- 5) ATDC, Jaipur
- 6) ATDC, Bangalore
- 7) ATDC, Noida
- 8) ATDC, Gurgaon
- 9) ATDC, Luddiana
- 10) ATDC, Trivandrum
- 11) ATDC, Turupur
- 12) ATDC, Navi Mumbai
- 13) ATDC, Indore

6. Home Science Colleges offering Textiles & Clothing

- 1) Dept. of Textiles & Clothing, Lady Irwin College, University of Delhi, New Delhi
- 2) Dept. of Textiles and Clothing, Institute of Home Economics, University of Delhi, New Delhi
- 3) College of Home Science, Punjab Agricultural University Ludhiana (Pb)
- 4) Govt. Home Science College, Panjab University, Chandigarh
- 5) Dept. of Home Science, Vasantha College, Banaras Hindu University (U.P.)
- 6) Dept. of Home Science, Handique Girl's College, Guwahati University, Guwahati (Assam)
- 7) College of Home Science, Assam Agricultural University, Jorhat. (Assam)
- 8) Dept. of Home Science, St. Joseph's College for Women, Visakhapatnam (A.P.)
- 9) Avinashilingam Institute of Home Science and Higher Education, Coimbatore (T.N.)
- 10) J.B.A.S. Womens College, Univ. of Madras, Chennai (T.N.)
- 11) Smt. UHD Central Institute of Home Science, Bangalore University, Bangalore (Kar.)
- 12) Dept. of Textiles & Clothing, Govt. Vidarbha Mahavidyalaa, Amaravati University, (Mah.)
- 13) Dr. B.M.N. College of Home Science, University of Bombay, Mumbai (Mah.)
- 14) PG-Dept. Textiles & Clothing, S.N.D.T. Women's University, Mumbai (Mah.)
- 15) Nirmala Niketan College of Home Science, University of Bombay, Mumbai (Mah.)
- 16) Clothing and Textiles Dept., M.S. University of Baroda, Vadodara (Gujarat)
- 17) SNTD College of Home Science, S.N.D.T. Womens' University, Pune (Mah.)
- 18) N.H. College Bramhapur, Nagpur University, Nagpur (Mah.)
- 19) College of Home Science, Rajasthan Agricultural University, Bikaner (Rajasthan)
- 20) Dept. of Home Science, JNV University, Jodhpur (Rajasthan)

- 21) Dept. of Home Science, Maharani College for Girls, University of Rajasthan, Jaipur (Raj.)
- 22) Dept. of Home Science and Clothing, Govt. M.H. College of Home Science, Jabalpur (M.P.)
- 23) Dept. of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar
- 24) Dept. of Home Science, Amravati University, Amravati (Mah.)

7. **Industrial Training Institutes (ITIs)**

4971 (1869 Govt. and 3102 Private) ITIs spread through out the country, out of which 1243 ITIs carry out some training programmes in Textiles & Apparel disciplines.

ANNEXURE - 5

Man Power Training for 5 million Workforce

Total Manpower for Textile Industry till 2010 (4 years)	:	50,00,000
Per year	:	12,50,000
Supervisory/middle Management till 2010 (15%)	:	7,50,000
Per year	:	1,87,500
Operators/workers till 2010 (85%)	:	42,50,000
Per Year	:	10,62,500

According to CRISIL STUDIES

Manpower for Textile Sector	:	50,00,000
Wvg./Spg./Knitting/Processing	:	10,00,000
Garmenting	:	<u>40,00,000</u>
		50,00,000

Break up of Manpower training

		<u>Supervisory</u>	<u>Workers</u>	<u>Total</u>
Textile Industry till 2010 (20%)	:	1,50,000	8,50,000	10,00,000
Per year	:	37,500	2,12,500	2,50,000
Garment Industry till 2010 (80%)	:	6,00,000	34,00,000	40,00,000
Per year	:	1,50,000	8,50,000	10,00,000

Summary

Trainee Composition:

- For Textile Industry	:	Supervisory	:	37,500/year
		Workers	:	<u>2,12,500/year</u>
		Total	:	2,50,000/year
- For Garment Industry	:	Supervisory	:	1,50,000/year
		Workers	:	<u>8,50,000/year</u>
		Total	:	10,00,000/year

Standard Structure of Training Programmes for workers to meet the Requirement of Textile Industry (for worker)

- Field of Training : Spinning/weaving/Knitting/Processing/Garmenting
- Trainer : Qualified, Trained in the respective field by recognised training institute/centre.
- Duration : Upto 3 months
(2 shifts)
- Batch size : 30 trainees
- No. of batches : 2 batches per month i.e. 60 trainees/Quarter
- Total No. of persons can be trained per year by each training centre = 240

I. Textile Industry

Supervisors to be trained/year	:	37,500
Approx. Existing capacity by 200 Institutes/year	:	<u>5,000</u>
Facilities to be created	:	32,500
Workers/operators to be trained/year	:	2,12,500
Approx. Existing Capacity	:	
PSCs : 360/year x 44	=	15,840
WSCs : 720/year x 24	=	17,280
IIHT : 720/year x 6	=	4,320
Home Science Colleges : 360 x 24	=	8,640
ITIs : 16 x 1553	=	<u>24,848</u>
		70,928
Facilities to be created	:	1,41,572

II. Garment Industry

Supervisors to be trained/year	:	1,50,000
Approx. Existing capacity by 150 Institutes/year	:	<u>4,500</u>
Facilities to be created	:	1,45,500
Workers/Tailors to be trained/year	:	8,50,000
Approx. Capacity	:	
ADTCs: 300 x 13	:	3,900
NIFT : 720 x 8	:	5,760
ITIs : 16 x 1488	:	23,808
Home Science Colleges : 120 x 24	:	<u>2,880</u>
		36,348
Facilities to be created	:	8,13,652

Training of Trainers (for workers)

Textile Industry	:	200
Garment Industry	:	3390

N.B.: one trainer/training centre will train up 240 trainees in a year/shift.

National Council for Vocational TrainingResolution

In pursuance of the recommendation of the All India Council for Technical Education, the Government of India in the Ministry of Labour Resolution No.RTA-428(5)/dated the 22nd May,1951, appointed a committee called the National Trade Certification Investigation Committee with instructions to prepare a scheme for the establishment of an All India Trades Board which would award certificates of proficiency to craftsmen in various engineering and building trades.

National Council for Vocational Training, an advisory body, was set up by the Government of India in the year 1956. The council has been entrusted with the responsibilities of prescribing standards and curricula for Craftsmen Training, advising the Government of India on the overall and programmes, conducting All India Tests for award National Trade Certificates. The National Council is chaired by the Ministry of Labour, with members representing Central and State Government Departments, Employers' and workers' Organisations, Professional and Learned Bodies, All India Council for Technical Organisation, etc. The State Council for Vocational Training at the State level and the Trade Committees have been established to assist the NCVT.

The structure of the National Council for Vocational Training is given below:-

- (a) NAME : The name of the Council shall be "The National Council for Vocational Training"
- (b) HEADQUARTERS: The headquarters of the Council shall be in New Delhi.

- (c) OBJECTS: The Council shall functions as a central agency to advise the Government of India in framing the training policy and co-ordinating vocational training through out India.
- (d) FUNCTIONS: The functions of the council shall be to
1. establish and award National Trade Certificates in engineering, non engineering, building, textile and leather trades and such other trade as may be brought within its scope by the Government of India.
 2. Prescribe standards in respect of syllabi, equipment, and scale of accommodation, duration of courses and methods of training.
 3. Arrange trade tests in various trade courses and lay down standards of proficiency required for a pass in the examination leading to the award of National Trade Certificate;
 4. Arrange for ad-hoc of periodical inspections of training institutions in the country to ensure that the standards prescribed by the council are being followed:
 5. Recognize training institutions run by government or by private agencies for purposes of the grant of National trade Certificates and lay down conditions for such recognition.
 6. Co-opt, if necessary, any person or persons to advise the council in connection with its work
 7. Prescribe qualification for the technical staff of training institutions;
 8. Prescribe the standards and conditions of eligibility for the award of National Trade Certificates.
 9. Generally control the conditions for the award of National Trade Certificates;

10. Recommend the provision of additional training facilities wherever necessary and render such assistance in the setting up of additional training institutions or in the organisation of additional training programmes as may be possible.
11. Advise the Central Government regarding distribution to State Governments of the contribution of the Government of India towards expenditure on the Craftsmen Training Scheme;
12. Perform such other function as may be entrusted to it by the Government of India.
13. Perform such functions as are assigned by or under the Apprentices Act, 1961.

DEPARTMENT : SPINNING**ANNEXURE - 7****REFRESH COURSE CONTENT FOR SKILLED WORKERS**

DEPARTMENT	PRACTICAL	THEORY	DAYS
BLOWROOM	WORK METHOD(LAP FEED)	objectives-machine parts and functions	1-10days
OPERATOR	material collection and feed ,attend faults, lap doffing,weight adjustment & stacking, lap transportation,machine cleaning, waste collection,patrolling	passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	WORK METHOD(chute feed)		
	material collectiion and feed,atted faults,cleaning waste collection and patrolling		
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
CARDING	WORKMETHOD(lap feed)		
OPERATOR	lap transportation ,lap replenishment, can doffing, can transportation, sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10days
	WORK METHOD (chute feed)		
	can doffing,can transportatiion ,sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection		
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
COMBER	can and lap transportation ,can and	objectives-machine parts and functions	1-10 days
PREPARATORY	lap replenishment, sliver piceing,	passage of material machine operations	
OPERATORS	attend roller lapping,patrolling,lap transportation,machine cleaning, attending faults ,waste collection	various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
COMBER	lap transportation,lap replenishment	objectives-machine parts and functions	1-10 days
OPERATOR	can transportation, can doffing ,sliver piceing,attend roller lapping,patrolling machine cleaning,attending faults waste collection	passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	allot machine to each individual based on the performance		
	to work independently on machines		

	and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
DRAWFRAME OPERATOR	can transportation, can replenishment sliver piecing, can doffing, attend roller lapping, patrolling, machine cleaning attending faults, waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
SIMPLEX OPERATOR	can transportation, can replenishment sliver piecing, can doffing, attend roller lapping, patrolling, machine cleaning attending faults, waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
SPINNING OPERATOR	piecing, bobbin transportation, bobbin replenishment, gaiting, traveller changing attending roller lapping, patrolling, attending faults, waste collection and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
WINDING OPERATOR	cop changing, mending breaks, doffing cone transportation, patrolling, attending faults and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot drums to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
DOUBLING/TFC OPERATOR	break mending cheese transportation cheese replenishment, gaiting, traveller changing, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days

DEPARTMENT-SPINNING**ANNEXURE -8****REFRESH COURSE CONTENT FOR OPERATIVES**

DEPARTMENT	PRACTICAL	THEORY	DAYS
BLOWROOM OPERATOR	WORK METHOD(LAP FEED) material collection and feed ,attend faults, lap doffing,weight adjustment & stacking, lap transportation,machine cleaning, waste collection,patrolling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10days
	WORK METHOD(chute feed) material collectiion and feed,atted faults,cleaning waste collection and patrolling allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
CARDING OPERATOR	WORKMETHOD(lap feed) lap transportation ,lap replenishment, can doffing, can transportation, sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10days
	WORK METHOD (chute feed) can doffing,can transportatiion ,sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
COMBER PREPARATORY OPERATORS	can and lap transportation ,can and lap replenishment, sliver piecing, attend roller lapping,patrolling,lap transportation,machine cleaning, attending faults ,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
COMBER OPERATOR	lap transportation,lap replenishment can transportation, can doffing ,sliver piecing,attend roller lapping,patrolling machine cleaning,attending faults waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		

DRAWFRAME OPERATOR	can transportation,can replenishment sliver piecing,can doffing,attend roller lapping,patrolling, machine cleaning attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.		
SIMPLEX OPERATOR	can transportation,can replenishment sliver piecing,can doffing,attend roller lapping,patrolling, machine cleaning attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.		
SPINNING OPERATOR	piecing,bobbin transportation,bobbin replenishment,gaiting,traveller changing attending roller lapping,patrolling, attending faults,waste collection and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10days
	allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.		
WINDING OPERATOR	cop changing,mending breaks,doffing cone transportation,patrolling,attending faults and machine cleaning maethos	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10days
	allot drums to each individual based on the performance to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.		
DOUBLING/TFC OPERATOR	break mending cheese transportation cheese replenishment,gaiting,traveller changing,patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10days

DEPARTMENT-SPINNING

ANNEXURE - 9

REFRESH COURSE CONTENT FOR FITTERS, JOBBERS AN TECHNICIANS

DEPARTMENT	PRACTICAL	THEORY	DAYS
BLOWROOM	WORK METHOD(LAP FEED)	objectives-machine parts and functions	1-10days

OPERATOR	material collection and feed ,attend faults, lap doffing,weight adjustment & stacking, lap transportation,machine cleaning, waste collection,patrolling	passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	WORK METHOD(chute feed)		
	material collectiion and feed,atted faults,cleaning waste collection and patrolling		
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
CARDING OPERATOR	WORKMETHOD(lap feed) lap transportation ,lap replenishment, can doffing, can transportation, sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10days
	WORK METHOD (chute feed)		
	can doffing,can transportatiion ,sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection		
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
COMBER PREPARATORY OPERATORS	can and lap transportation ,can and lap replenishment, sliver piceing, attend roller lapping,patrolling,lap transportation,machine cleaning, attending faults ,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
COMBER OPERATOR	lap transportation,lap replenishment can transportation, can doffing ,sliver piceing,attend roller lapping,patrolling machine cleaning,attending faults waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
DRAWFRAME	can transportation,can replenishment	objectives-machine parts and functions	1-10 days

OPERATOR	sliver piecing,can doffing,attend roller	passage of material machine operations	
	lapping,patrolling, machine cleaning	various jobs to be carried out in the	
	attending faults,waste collection	machine by the operator-color coding	
		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
SIMPLEX	can transportation,can replenishment	objectives-machine parts and functions	1-10 days
OPERATOR	sliver piecing,can doffing,attend roller	passage of material machine operations	
	lapping,patrolling, machine cleaning	various jobs to be carried out in the	
	attending faults,waste collection	machine by the operator-color coding	
		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
SPINNING	piecing,bobbin transportation,bobbin	objectives-machine parts and functions	1-10days
OPERATOR	replenishment,gaiting,traveller changing	passage of material machine operations	
	attending roller lapping,patrolling,	various jobs to be carried out in the	
	attending faults,waste collection and	machine by the operator-color coding	
	machine cleaning methods	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
WINDING	cop changing,mending breaks,doffing	objectives-machine parts and functions	1-10days
OPERATOR	cone transportation,patrolling,attending	passage of material machine operations	
	faults and machine cleaning maethos	various jobs to be carried out in the	
		machine by the operator-color coding	
	allot drums to each individual based	machine signals -check points- setting	
	on the performance	quality-defects and remedies-wastes	
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
DOUBLING/TFC	break mending cheese transportation	objectives-machine parts and functions	1-10days
OPERATOR	cheese replenishment,gaiting,traveller	passage of material machine operations	
	changing,patrolling and machine	various jobs to be carried out in the	
	cleaning methods	machine by the operator-color coding	
		machine signals -check points- setting	
		quality-defects and remedies-wastes	

DEPARTMENT-SPINNING

ANNEXURE - 10

REFRESH COURSE CONTENT FOR SUPERVISORS

DEPARTMENT	PRACTICAL	THEORY	DAYS
BLOWROOM	WORK METHOD(LAP FEED)	objectives-machine parts and functions	1-7days
OPERATOR	material collection and feed ,attend	passage of material machine operations	
	faults, lap doffing,weight adjustment &	various jobs to be carried out in the	
	stacking, lap transportation,machine	machine by the operator-color coding	

	cleaning, waste collection,patrolling	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	WORK METHOD(chute feed)		
	material collectiion and feed,atted		
	faults,cleaing waste collection and		
	patrolling		
	allot machine to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
CARDING	WORKMETHOD(lap feed)		
OPERATOR	lap transportation ,lap replenishment,	objectives-machine parts and functions	1-7days
	can doffing, can transportation, sliver	passage of material machine operations	
	piecing,patrolling,machine cleaning	various jobs to be carried out in the	
	methods,attending faults,waste	machine by the operator-color coding	
	collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	WORK METHOD (chute feed)		
	can doffing,can transportatiion ,sliver		
	piecing,patrolling,machine cleaning		
	methods,attending faults,waste		
	collection		
	allot machine to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
COMBER	can and lap transportation ,can and	objectives-machine parts and functions	1-7days
PREPARATORY	lap replenishment, sliver piecing,	passage of material machine operations	
OPERATORS	attend roller lapping,patrolling,lap	various jobs to be carried out in the	
	transportation,machine cleaning,	machine by the operator-color coding	
	attending faults ,waste collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
COMBER	lap transportation,lap replenishment	objectives-machine parts and functions	1-7days
OPERATOR	can transportation, can doffing ,sliver	passage of material machine operations	
	piecing,attend roller lapping,patrolling	various jobs to be carried out in the	
	machine cleaning,attending faults	machine by the operator-color coding	
	waste collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
DRAWFRAME	can transportation,can replenishment	objectives-machine parts and functions	1-7days
OPERATOR	sliver piecing,can doffing,attend roller	passage of material machine operations	
	lapping,patrolling, machine cleaning	various jobs to be carried out in the	
	attending faults,waste collection	machine by the operator-color coding	

		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production,defects,wastes,machine		
	repairs, etc.		
SIMPLEX	can transportation,can replenishment	objectives-machine parts and functions	1-7days
OPERATOR	sliver piecing,can doffing,attend roller	passage of material machine operations	
	lapping,patrolling, machine cleaning	various jobs to be carried out in the	
	attending faults,waste collection	machine by the operator-color coding	
		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production,defects,wastes,machine		
	repairs, etc.		
SPINNING	piecing,bobbin transportation,bobbin	objectives-machine parts and functions	1-7days
OPERATOR	replenishment,gaiting,traveller changing	passage of material machine operations	
	attending roller lapping,patrolling,	various jobs to be carried out in the	
	attending faults,waste collection and	machine by the operator-color coding	
	machine cleaning methods	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production,defects,wastes,machine		
	repairs, etc.		
WINDING	cop changing,mending breaks,doffing	objectives-machine parts and functions	1-7days
OPERATOR	cone transportation,patrolling,attending	passage of material machine operations	
	faults and machine cleaning methods	various jobs to be carried out in the	
		machine by the operator-color coding	
	allot drums to each individual based	machine signals -check points- setting	
	on the performance	quality-defects and remedies-wastes	
	to work independently on machines		
	and simultaneously monitoring the		
	production,defects,wastes,machine		
	repairs, etc.		
DOUBLING/TFC	break mending cheese transportation	objectives-machine parts and functions	1-7days
OPERATOR	cheese replenishment,gaiting,traveller	passage of material machine operations	
	changing,patrolling and machine	various jobs to be carried out in the	
	cleaning methods	machine by the operator-color coding	
		machine signals -check points- setting	
		quality-defects and remedies-wastes	

DEPARTMENT-SPINNING

ANNEXURE - 11

REFRESH COURSE CONTENT FOR DEPARTMENTAL INCHARGE

DEPARTMENT	PRACTICAL	THEORY	DAYS
BLOWROOM	WORK METHOD(LAP FEED)	objectives-machine parts and functions	1-5 days
OPERATOR	material collection and feed ,attend	passage of material machine operations	
	faults, lap doffing,weight adjustment &	various jobs to be carried out in the	
	stacking, lap transportation,machine	machine by the operator-color coding	
	cleaning, waste collection,patrolling	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	WORK METHOD(chute feed)		

	material collection and feed,attended		
	faults, cleaning waste collection and		
	patrolling		
	allot machine to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production, defects, wastes, machine		
	repairs, etc.		
CARDING	WORKMETHOD(lap feed)		
OPERATOR	lap transportation ,lap replenishment,	objectives-machine parts and functions	1-5 days
	can doffing, can transportation, sliver	passage of material machine operations	
	piecing, patrolling, machine cleaning	various jobs to be carried out in the	
	methods, attending faults, waste	machine by the operator-color coding	
	collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	WORK METHOD (chute feed)		
	can doffing, can transportation ,sliver		
	piecing, patrolling, machine cleaning		
	methods, attending faults, waste		
	collection		
	allot machine to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production, defects, wastes, machine		
	repairs, etc.		
COMBER	can and lap transportation ,can and	objectives-machine parts and functions	1-5 days
PREPARATORY	lap replenishment, sliver piecing,	passage of material machine operations	
OPERATORS	attend roller lapping, patrolling, lap	various jobs to be carried out in the	
	transportation, machine cleaning,	machine by the operator-color coding	
	attending faults ,waste collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production, defects, wastes, machine		
	repairs, etc.		
COMBER	lap transportation, lap replenishment	objectives-machine parts and functions	1-5 days
OPERATOR	can transportation, can doffing ,sliver	passage of material machine operations	
	piecing, attend roller lapping, patrolling	various jobs to be carried out in the	
	machine cleaning, attending faults	machine by the operator-color coding	
	waste collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production, defects, wastes, machine		
	repairs, etc.		
DRAWFRAME	can transportation, can replenishment	objectives-machine parts and functions	1-5 days
OPERATOR	sliver piecing, can doffing, attend roller	passage of material machine operations	
	lapping, patrolling, machine cleaning	various jobs to be carried out in the	
	attending faults, waste collection	machine by the operator-color coding	
		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		

	and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
SIMPLEX OPERATOR	can transportation, can replenishment sliver piecing, can doffing, attend roller lapping, patrolling, machine cleaning attending faults, waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-5 days
	allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
SPINNING OPERATOR	piecing, bobbin transportation, bobbin replenishment, gaiting, traveller changing attending roller lapping, patrolling, attending faults, waste collection and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-5 days
	allot machine to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
WINDING OPERATOR	cop changing, mending breaks, doffing cone transportation, patrolling, attending faults and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-5 days
	allot drums to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
DOUBLING/TFC OPERATOR	break mending cheese transportation cheese replenishment, gaiting, traveller changing, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-5 days

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , , BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

DEPARTMENT-WEAVING

ANNEXURE - 12

REFRESH COURSE CONTENT FOR SKILLED WORKERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
WARPING OPERATOR	supply package transportation, supply package replenishment, beam doffing and transportaion, break mending, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based		

	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
SIZING	beam transportation,beam loading in creel	objectives-machine parts and functions	1-15days
OPERATOR	attend lapping ,leasing,beam doffing ,various	passage of material machine operations	
	testing and testing procededures,patrolling and	various jobs to be carried out in the	
	machine cleaning methods	machine by the operator-color coding	
		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
DRAWING-IN	beam transportation,heald shafts and reed	objectives-machine parts and functions	1-15days
OPERATOR	handling, stand fixing /dismangling methods	passage of material machine operations	
	pattern/design knowledge , drawing and	various jobs to be carried out in the	
	denting of ends and cleaning methods	machine by the operator-color coding	
		machine signals -check points- setting	
	allot jobs to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		
LOOM-SHED	attending warp and weft breaks ,cone	objectives-machine parts and functions	1-15days
OPERATOR	transportation and replenishment,patrol &	passage of material-primary motions	
	inspect beams,cloth defects and rectification	like shedding,picking,and beating	
	cleaning methods	secondary motions like let-off ,take-up	
		and auxiliary motions like warp/weft stop	
	allot looms to each individual based	motions,brake and driving mechanisms	
	on the performance	loom operations,various jobs carried out	
	to work independently on machines	in loom by the operator,colour coding	
	and simultaneously monitoring the	loom signals,set points,settings,quality	
	productiion,defects,wastes,machine	defects and remedies,wastes.	
	repairs, etc.		
BEAM GAITING	beam transportation,arranging knotting stand	objectives-machine parts and functions	1-15days
KNOTTING	dress warp ends, knotting and gaiting	passage of material machine operations	
	operations,inspect beams,run loom after	various jobs to be carried out in the	
	gaiting,cleaning methods	machine by the operator-color coding	
		machine signals -check points- setting	
	allot work to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		

DEPARTMENT-WEAVING

ANNEXURE - 13

REFRESH COURSE CONTENT FOR OPERATIVES

DEPARTMENT	PRACTICAL	THEORY	DAYS
WARPING	supply package transportation,supply	objectives-machine parts and functions	1-15days
OPERATOR	package replenishment,beam doffing and	passage of material machine operations	
	transportaion,break mending,patrolling and	various jobs to be carried out in the	
	machine cleaning methods	machine by the operator-color coding	

		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production,defects,wastes,machine		
	repairs, etc.		
SIZING	beam transportation,beam loading in creel	objectives-machine parts and functions	1-15days
OPERATOR	attend lapping ,leasing,beam doffing ,various	passage of material machine operations	
	testing and testing procedures,patrolling and	various jobs to be carried out in the	
	machine cleaning methods	machine by the operator-color coding	
		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production,defects,wastes,machine		
	repairs, etc.		
DRAWING-IN	beam transportation,heald shafts and reed	objectives-machine parts and functions	1-15days
OPERATOR	handling, stand fixing /dismangling methods	passage of material machine operations	
	pattern/design knowledge , drawing and	various jobs to be carried out in the	
	denting of ends and cleaning methods	machine by the operator-color coding	
		machine signals -check points- setting	
	allot jobs to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production,defects,wastes,machine		
	repairs, etc.		
LOOM-SHED	attending warp and weft breaks ,cone	objectives-machine parts and functions	1-15days
OPERATOR	transportation and replenishment,patrol &	passage of material-primary motions	
	inspect beams,cloth defects and rectification	like shedding,picking,and beating	
	cleaning methods	secondary motions like let-off ,take-up	
		and auxiliary motions like warp/weft stop	
	allot looms to each individual based	motions,brake and driving mechanisms	
	on the performance	loom operations,various jobs carried out	
	to work independently on machines	in loom by the operator,colour coding	
	and simultaneously monitoring the	loom signals,set points,settings,quality	
	production,defects,wastes,machine	defects and remedies,wastes.	
	repairs, etc.		
BEAM GAITING	beam transportation,arranging knotting stand	objectives-machine parts and functions	1-15days
KNOTTING	dress warp ends, knotting and gaiting	passage of material machine operations	
	operations,inspect beams,run loom after	various jobs to be carried out in the	
	gaiting,cleaning methods	machine by the operator-color coding	
		machine signals -check points- setting	
	allot work to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	production,defects,wastes,machine		
	repairs, etc.		

DEPARTMENT-WEAVING

ANNEXURE - 14

REFRESH COURSE CONTENT FOR FITTERS JOBBERS AND TECNICIANS

DEPARTMENT	PRACTICAL	THEORY	DAYS
WARPING	supply package transportation,supply	objectives-machine parts and functions	1-15days
OPERATOR	package replenishment,beam doffing and	passage of material machine operations	

	transportation,break mending,patrolling and machine cleaning methods	various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.		
SIZING OPERATOR	beam transportation,beam loading in creel attend lapping ,leasing,beam doffing ,various testing and testing procedures,patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.		
DRAWING-IN OPERATOR	beam transportation,heald shafts and reed handling, stand fixing /dismangling methods pattern/design knowledge , drawing and denting of ends and cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot jobs to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.		
LOOM-SHED OPERATOR	attending warp and weft breaks ,cone transportation and replenishment,patrol & inspect beams,cloth defects and rectification cleaning methods	objectives-machine parts and functions passage of material-primary motions like shedding,picking,and beating secondary motions like let-off ,take-up and auxiliary motions like warp/weft stop motions,brake and driving mechanisms loom operations,various jobs carried out in loom by the operator,colour coding loom signals,set points,settings,quality defects and remedies,wastes.	1-15days
	allot looms to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.		
BEAM GAITING KNOTTING	beam transportation,arranging knotting stand dress warp ends, knotting and gaiting operations,inspect beams,run loom after gaiting,cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot work to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.		

DEPARTMENT-WEAVING

ANNEXURE - 15

REFRESH COURSE CONTENT FOR SUPERVISORS

DEPARTMENT	PRACTICAL	THEORY	DAYS

WARPING OPERATOR	supply package transportation, supply package replenishment, beam doffing and transportaion, break mending, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-7days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion, defects, wastes, machine repairs, etc.		
SIZING OPERATOR	beam transportation, beam loading in creel attend lapping ,leasing, beam doffing , various testing and testing proceeedures, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-7days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion, defects, wastes, machine repairs, etc.		
DRAWING-IN OPERATOR	beam transportation, heald shafts and reed handling, stand fixing /dismangling methods pattern/design knowledge , drawing and denting of ends and cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-7days
	allot jobs to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion, defects, wastes, machine repairs, etc.		
LOOM-SHED OPERATOR	attending warp and weft breaks ,cone transportation and replenishment, patrol & inspect beams, cloth defects and rectification cleaning methods	objectives-machine parts and functions passage of material-primary motions like shedding, picking, and beating secondary motions like let-off ,take-up and auxiliary motions like warp/weft stop motions, brake and driving mechanisms	1-7days
	allot looms to each individual based on the performance	loom operations, various jobs carried out in loom by the operator, colour coding	
	to work independently on machines and simultaneously monitoring the productiion, defects, wastes, machine repairs, etc.	loom signals, set points, settings, quality defects and remedies, wastes.	
BEAM GAITING KNOTTING	beam transportation, arranging knotting stand dress warp ends, knotting and gaiting operations, inspect beams, run loom after gaiting, cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-7days
	allot work to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion, defects, wastes, machine repairs, etc.		

DEPARTMENT-WEAVING

DEPARTMENT	PRACTICAL	THEORY	DAYS
WARPING OPERATOR	supply package transportation, supply package replenishment, beam doffing and transportaion, break mending, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-5days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion, defects, wastes, machine repairs, etc.		
SIZING OPERATOR	beam transportation, beam loading in creel attend lapping ,leasing, beam doffing , various testing and testing proceedures, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-5days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion, defects, wastes, machine repairs, etc.		
DRAWING-IN OPERATOR	beam transportation, heald shafts and reed handling, stand fixing /dismangling methods pattern/design knowledge , drawing and denting of ends and cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-5days
	allot jobs to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion, defects, wastes, machine repairs, etc.		
LOOM-SHED OPERATOR	attending warp and weft breaks , cone transportation and replenishment, patrol & inspect beams, cloth defects and rectification cleaning methods	objectives-machine parts and functions passage of material-primary motions like shedding, picking, and beating secondary motions like let-off ,take-up and auxilliary motions like warp/weft stop motions, brake and driving mechanisms	1-5days
	allot looms to each individual based on the performance	loom operations, various jobs carried out in loom by the operator, colour coding	
	to work independently on machines and simultaneously monitoring the productiion, defects, wastes, machine repairs, etc.	loom signals, set points, settings, quality defects and remedies, wastes.	
BEAM GAITING KNOTTING	beam transportation, arranging knotting stand dress warp ends, knotting and gaiting operations, inspect beams, run loom after gaiting, cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-5days
	allot work to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion, defects, wastes, machine repairs, etc.		

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , , BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

REFRESH COURSE CONTENT FOR SKILLED WORKERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
KNITTING	type of machine.replenishing supply	objectives-machine parts and functions	1-15days
	package,break mending,cloth roll cutting	passage of material machine operations	
	transportation sampling proceedure	various jobs to be carried out in the	
	attending various faults occuring in machine,	machine by the operator-color coding	
	cleaning methods,oiling to various parts	machine signals -check points- setting	
	machine monitoring	quality-defects and remedies-wastes	
	allot work to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		

DEPARTMENT-KNITTING**ANNEXURE - 18****REFRESH COURSE CONTENT FOR OPERATIVES**

DEPARTMENT	PRACTICAL	THEORY	DAYS
KNITTING	type of machine.replenishing supply	objectives-machine parts and functions	1-15days
	package,break mending,cloth roll cutting	passage of material machine operations	
	transportation sampling proceedure	various jobs to be carried out in the	
	attending various faults occuring in machine,	machine by the operator-color coding	
	cleaning methods,oiling to various parts	machine signals -check points- setting	
	machine monitoring	quality-defects and remedies-wastes	
	allot work to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		

DEPARTMENT-KNITTING**ANNEXURE - 19****REFRESH COURSE CONTENT FOR FITTERS ,JOBBER,AND TECHNICIANS**

DEPARTMENT	PRACTICAL	THEORY	DAYS
KNITTING	type of machine.replenishing supply	objectives-machine parts and functions	1-15days
	package,break mending,cloth roll cutting	passage of material machine operations	
	transportation sampling proceedure	various jobs to be carried out in the	
	attending various faults occuring in machine,	machine by the operator-color coding	
	cleaning methods,oiling to various parts	machine signals -check points- setting	
	machine monitoring	quality-defects and remedies-wastes	
	allot work to each individual based		
	on the performance		
	to work independently on machines		
	and simultaneously monitoring the		
	productiion,defects,wastes,machine		
	repairs, etc.		

DEPARTMENT-KNITTING**ANNEXURE - 20****REFRESH COURSE CONTENT FOR SUPERVISORS**

DEPARTMENT	PRACTICAL	THEORY	DAYS
KNITTING	type of machine.replenishing supply	objectives-machine parts and functions	1-7days
	package,break mending,cloth roll cutting	passage of material machine operations	
	transportation sampling proceedure	various jobs to be carried out in the	
	attending various faults occuring in machine,	machine by the operator-color coding	
	cleaning methods,oiling to various parts	machine signals -check points- setting	
	machine monitoring,production monitoring	quality-defects and remedies-wastes	

	quality controlling,labour handing and management,design analysis		
	allot work to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		

DEPARTMENT-KNITTING

ANNEXURE - 21

REFRESH COURSE CONTENT FOR DEPARTMENTAL INCHARGE

DEPARTMENT	PRACTICAL	THEORY	DAYS
KNITTING	type of machine.replenishing supply	objectives-machine parts and functions	1-15days
	package,break mending,cloth roll cutting	passage of material machine operations	
	transportation sampling proceedure	various jobs to be carried out in the	
	attending various faults occuring in machine,	machine by the operator-color coding	
	cleaning methods,oiling to various parts	machine signals -check points- setting	
	machine monitoring,production monitiring	quality-defects and remedies-wastes	
	quality controlling,labour handing and management,design analysis,costing		
	cost control,management		
	allot work to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the		
	productiion,defects,wastes,machine repairs, etc.		

DEPARTMENT-PROCESSING

ANNEXURE - 22

REFRESH COURSE CONTENT FOR SKILLED WORKERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
SCORING AND BLEACHING	supply/finished material transportation, loading/machineadjustment for varying	objectives-machine parts and functions	1-15days
	work conditions,sample collection and testing	passage of material machine operations	
	methods,chemical weighing and preparation	various jobs to be carried out in the	
	lot change,patrolling and continous	machine by the operator-machine signals	
	monitiring,machine cleaning and oiling	testing instruments and testing methods	
		chemical and their usage-check points-	
		settings -quality-defects and remedies-	
	allot work to each individual based on the performance	waste control	
	to work independently on machines and simultaneously monitoring the		
	productiion,defects,wastes,machine repairs, etc.		
DYEING	supply/finished material transportation, loading/machineadjustment for varying	objectives-machine parts and functions	1-15days
	work conditions,sample collection and testing	passage of material machine operations	
	methods,chemical weighing and preparation	various jobs to be carried out in the	
	lot change,patrolling and continous	machine by the operator-machine signals	
	monitiring,machine cleaning and oiling	testing instruments and testing methods	
		dye chemicals and their usage-	
		settings -quality-defects and remedies-	
	allot work to each individual based on the performance	waste control	
	to work independently on machines		

	and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine		
PRINTING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine		
FINISHING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine		

DEPARTMENT-PROCESSING

ANNEXURE - 23

REFRESH COURSE CONTENT FOR OPERATIVES

DEPARTMENT	PRACTICAL	THEORY	DAYS
SCORING AND BLEACHING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemical and their usage-check points- settings -quality-defects and remedies- waste control	1-15days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
DYEING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the		

	production, defects, wastes, machine repairs, unloading material in machine		
PRINTING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine		
FINISHING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine		

DEPARTMENT-PROCESSING

ANNEXURE - 24

REFRESH COURSE CONTENT FOR FITTERS ,JOBBER AND TECHNICIANS

DEPARTMENT	PRACTICAL	THEORY	DAYS
SCORING AND BLEACHING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemical and their usage-check points- settings -quality-defects and remedies- waste control	1-15days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
DYEING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine		

PRINTING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine		
FINISHING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine		

DEPARTMENT-PROCESSING

ANNEXURE - 25

REFRESH COURSE CONTENT FOR SUPERVISORS

DEPARTMENT	PRACTICAL	THEORY	DAYS
SCORING AND BLEACHING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemical and their usage-check points- settings -quality-defects and remedies- waste control	1-7days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.		
DYEING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling shade matching, labour handling, production quality control, checking parameters	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-7days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the production, defects, wastes, machine		

	repairs,unloading material in machine		
PRINTING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitiring,machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-7days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs,unloading material in machine		
FINISHING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitiring,machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemicals and their usage- settings -quality-defects and remedies- waste control	1-7days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs,unloading material in machine		

DEPARTMENT-PROCESSING

ANNEXURE - 26

REFRESH COURSE CONTENT FOR DEPARTMENTAL INCHARGE

DEPARTMENT	PRACTICAL	THEORY	DAYS
SCORING AND BLEACHING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitiring,machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemical and their usage-check points- settings -quality-defects and remedies- waste control	1-5days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.		
DYEING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitiring,machine cleaning and oiling shade matching,labour handling ,production quality control,checking parameters	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-5days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine		

	repairs,unloading material in machine		
PRINTING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitiring,machine cleaning and oiling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-5days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs,unloading material in machine		
FINISHING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitiring,machine cleaning and oiling management,program planning and organising	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemicals and their usage- settings -quality-defects and remedies- waste control	1-5days
	allot work to each individual based on the performance to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs,unloading material in machine		

DEPARTMENT-GARMENTS

ANNEXURE - 27

REFRESH COURSE CONTENT FOR SKILLED WORKERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
SEWING M/C	cutting and marking ,stitching,hand stitches back stitch ,basting,button hole stitch,chain stitch,hand hemming stitch,button hemming curves and guiding fabrics,pressing,threading bobbin preparation , tension adjustmnet cleaning methods ,oiling and maintenance	objectives-machine parts and functions machine operations,various jobs to be carried out in the machine by the worker-check points-setting-quality- defects and remedies-waste control	1-15days

DEPARTMENT-GARMENTS

ANNEXURE - 28

REFRESH COURSE CONTENT FOR OPERATIVES

DEPARTMENT	PRACTICAL	THEORY	DAYS
SEWING M/C	cutting and marking ,stitching,hand stitches back stitch ,basting,button hole stitch,chain stitch,hand hemming stitch,button hemming curves and guiding fabrics,pressing,threading bobbin preparation , tension adjustmnet cleaning methods ,oiling and maintenance	objectives-machine parts and functions machine operations,various jobs to be carried out in the machine by the worker-check points-setting-quality- defects and remedies-waste control	1-15days

DEPARTMENT-GARMENTS

ANNEXURE - 29

REFRESH COURSE CONTENT FOR FITTERS,JOBBER, AND TECNICIANS

DEPARTMENT	PRACTICAL	THEORY	DAYS

SEWING M/C	cutting and marking ,stitching,hand stitches	objectives-machine parts and functions	1-15days
	back stitch ,basting,button hole stitch,chain	machine operations,various jobs to be	
	stitch,hand hemming stitch,button hemming	carried out in the machine by the	
	curves and guiding fabrics,pressing,threading	worker-check points-setting-quality-	
	bobbin preparation , tension adjustmnet	defects and remedies-waste control	
	cleaning methods ,oiling and maintenance		
	machine maintenance and repairing		

DEPARTMENT-GARMENTS

ANNEXURE - 30

REFRESH COURSE CONTENT FOR SUPERVISORS

DEPARTMENT	PRACTICAL	THEORY	DAYS
SEWING M/C	cutting and marking ,stitching,hand stitches	objectives-machine parts and functions	1-7days
	back stitch ,basting,button hole stitch,chain	machine operations,various jobs to be	
	stitch,hand hemming stitch,button hemming	carried out in the machine by the	
	curves and guiding fabrics,pressing,threading	worker-check points-setting-quality-	
	bobbin preparation , tension adjustmnet	defects and remedies-waste control	
	cleaning methods ,oiling and maintenance		
	production and quality control		
	allot m/c to each individual based on the		
	performance.		
	To work independently on m/c and		
	simultaneously monitoring the production		
	defects, waste, machinen repairs etc.,		
	unloading material in machine		

DEPARTMENT-GARMENTS

ANNEXURE - 31

REFRESH COURSE CONTENT FOR DEPARTMENTAL INCHARGE

DEPARTMENT	PRACTICAL	THEORY	DAYS
SEWING M/C	cutting and marking ,stitching,hand stitches	objectives-machine parts and functions	1-5days
	back stitch ,basting,button hole stitch,chain	machine operations,various jobs to be	
	stitch,hand hemming stitch,button hemming	carried out in the machine by the	
	curves and guiding fabrics,pressing,threading	worker-check points-setting-quality-	
	bobbin preparation , tension adjustmnet	defects and remedies-waste control	
	cleaning methods ,oiling and maintenance		
	production and quality control costing and		
	cost control		
	allot m/c to each individual based on the		
	performance.		
	To work independently on m/c and		
	simultaneously monitoring the production		
	defects, waste, machinen repairs etc.,		
	unloading material in machine		

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , , BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

DEPARTMENT-SPINNING

ANNEXURE - 32

SHORT TERM COURSE CONTENT FOR SKILLED WORKERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
BLOWROOM	WORK METHOD(LAP FEED)	objectives-machine parts and functions	1-15days
OPERATOR	material collection and feed ,attend	passage of material machine operations	
	faults, lap doffing,weight adjustment &	various jobs to be carried out in the	
	stacking, lap transportation,machine	machine by the operator-color coding	

	cleaning, waste collection,patrolling	machine signals -check points- setting quality-defects and remedies-wastes	
	WORK METHOD(chute feed)		
	material collectiion and feed,atted		
	faults,clearing waste collection and patrolling		
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
CARDING OPERATOR	WORKMETHOD(lap feed) lap transportation ,lap replenishment, can doffing, can transportation, sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10days
	WORK METHOD (chute feed)		
	can doffing,can transportatiion ,sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection		
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
COMBER PREPARATORY OPERATORS	can and lap transportation ,can and lap replenishment, sliver piecing, attend roller lapping,patrolling,lap transportation,machine cleaning, attending faults ,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15 days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
COMBER OPERATOR	lap transportation,lap replenishment can transportation, can doffing ,sliver piecing,attend roller lapping,patrolling machine cleaning,attending faults waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines	discussion on the observation made by	16-60days

	and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	
DRAWFRAME OPERATOR	can transportation,can replenishment sliver piecing,can doffing,attend roller lapping,patrolling, machine cleaning attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
SIMPLEX OPERATOR	can transportation,can replenishment sliver piecing,can doffing,attend roller lapping,patrolling, machine cleaning attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15 days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
SPINNING OPERATOR	piecing,bobbin transportation,bobbin replenishment,gaiting,traveller changing attending roller lapping,patrolling, attending faults,waste collection and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90days
WINDING OPERATOR	cop changing,mending breaks,doffing cone transportation,patrolling,attending faults and machine cleaning maethos	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot drums to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
DOUBLING/TFC	break mending cheese transportation	objectives-machine parts and functions	1-15days

OPERATOR	cheese replenishment,gaiting,traveller changing,patrolling and machine cleaning methods	passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , ,BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

DEPARTMENT-SPINNING

ANNEXURE - 33

SHORT TERM COURSE CONTENT FOR OPERATIVES

DEPARTMENT	PRACTICAL	THEORY	DAYS
BLOWROOM OPERATOR	WORK METHOD(LAP FEED) material collection and feed ,attend faults, lap doffing,weight adjustment & stacking, lap transportation,machine cleaning, waste collection,patrolling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	WORK METHOD(chute feed) material collectiion and feed,atted faults,cleaning waste collection and patrolling		
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
CARDING OPERATOR	WORKMETHOD(lap feed) lap transportation ,lap replenishment, can doffing, can transportation, sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10days
	WORK METHOD (chute feed) can doffing,can transportatiion ,sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection		
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the productiion,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
COMBER PREPARATORY OPERATORS	can and lap transportation ,can and lap replenishment, sliver piceing, attend roller lapping,patrolling,lap transportation,machine cleaning,	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding	1-15 days

	attending faults ,waste collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
COMBER	lap transportation,lap replenishment	objectives-machine parts and functions	1-15days
OPERATOR	can transportation, can doffing ,sliver	passage of material machine operations	
	piecing,attend roller lapping,patrolling	various jobs to be carried out in the	
	machine cleaning,attending faults	machine by the operator-color coding	
	waste collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
DRAWFRAME	can transportation,can replenishment	objectives-machine parts and functions	1-10 days
OPERATOR	sliver piecing,can doffing,attend roller	passage of material machine operations	
	lapping,patrolling, machine cleaning	various jobs to be carried out in the	
	attending faults,waste collection	machine by the operator-color coding	
		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
SIMPLEX	can transportation,can replenishment	objectives-machine parts and functions	1-15 days
OPERATOR	sliver piecing,can doffing,attend roller	passage of material machine operations	
	lapping,patrolling, machine cleaning	various jobs to be carried out in the	
	attending faults,waste collection	machine by the operator-color coding	
		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
SPINNING	piecing,bobbin transportation,bobbin	objectives-machine parts and functions	1-15days
OPERATOR	replenishment,gaiting,traveller changing	passage of material machine operations	
	attending roller lapping,patrolling,	various jobs to be carried out in the	
	attending faults,waste collection and	machine by the operator-color coding	
	machine cleaning methods	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-90days

	and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	
WINDING OPERATOR	cop changing,mending breaks,doffing cone transportation,patrolling,attending faults and machine cleaning maethos	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot drums to each individual based on the performance	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
DOUBLING/TFC OPERATOR	break mending cheese transportation cheese replenishment,gaiting,traveller changing,patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , ,BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

DEPARTMENT-SPINNING

ANNEXURE - 34

SHORT TERM COURSE CONTENT FOR FITTERS,JOBBER AND TECNICIANS

DEPARTMENT	PRACTICAL	THEORY	DAYS
BLOWROOM OPERATOR	WORK METHOD(LAP FEED) material collection and feed ,attend faults, lap doffing,weight adjustment & stacking, lap transportation,machine cleaning, waste collection,patrolling	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	WORK METHOD(chute feed) material collectiion and feed,atted faults,clearing waste collection and patrolling		
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
CARDING OPERATOR	WORKMETHOD(lap feed) lap transportation ,lap replenishment, can doffing, can transportation, sliver piceing,patrolling,machine cleaning methods,attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting	1-10days

		quality-defects and remedies-wastes	
	WORK METHOD (chute feed)		
	can doffing,can transportation ,sliver		
	piecing,patrolling,machine cleaning		
	methods,attending faults,waste		
	collection		
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	production,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
COMBER PREPARATORY OPERATORS	can and lap transportation ,can and lap replenishment, sliver piecing, attend roller lapping,patrolling,lap	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the	1-15 days
	transportation,machine cleaning, attending faults ,waste collection	machine by the operator-color coding machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	production,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
COMBER OPERATOR	lap transportation,lap replenishment can transportation, can doffing ,sliver	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the	1-15days
	piecing,attend roller lapping,patrolling	machine by the operator-color coding	
	machine cleaning,attending faults	machine signals -check points- setting	
	waste collection	quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	production,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
DRAWFRAME OPERATOR	can transportation,can replenishment sliver piecing,can doffing,attend roller	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the	1-10 days
	lapping,patrolling, machine cleaning	machine by the operator-color coding	
	attending faults,waste collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	production,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
SIMPLEX OPERATOR	can transportation,can replenishment sliver piecing,can doffing,attend roller	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the	1-15 days
	lapping,patrolling, machine cleaning		

	attending faults,waste collection	machine by the operator-color coding	
		machine signals -check points- setting	
	allot machine to each individual based	quality-defects and remedies-wastes	
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
SPINNING	piecing,bobbin transportation,bobbin	objectives-machine parts and functions	1-15days
OPERATOR	replenishment,gaiting,traveller changing	passage of material machine operations	
	attending roller lapping,patrolling,	various jobs to be carried out in the	
	attending faults,waste collection and	machine by the operator-color coding	
	machine cleaning methods	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-90days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
WINDING	cop changing,mending breaks,doffing	objectives-machine parts and functions	1-15days
OPERATOR	cone transportation,patrolling,attending	passage of material machine operations	
	faults and machine cleaning maethos	various jobs to be carried out in the	
		machine by the operator-color coding	
	allot drums to each individual based	machine signals -check points- setting	
	on the performance	quality-defects and remedies-wastes	
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
DOUBLING/TFC	break mending cheese transportation	objectives-machine parts and functions	1-15days
OPERATOR	cheese replenishment,gaiting,traveller	passage of material machine operations	
	changing,patrolling and machine	various jobs to be carried out in the	
	cleaning methods	machine by the operator-color coding	
		machine signals -check points- setting	
		quality-defects and remedies-wastes	
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

DEPARTMENT-SPINNING

ANNEXURE - 35

SHORT TERM COURSE CONTENT FOR SUPERVISORS

DEPARTMENT	PRACTICAL	THEORY	DAYS
BLOWROOM	WORK METHOD(LAP FEED)	objectives-machine parts and functions	1-15days
OPERATOR	material collection and feed ,attend	passage of material machine operations	
	faults, lap doffing,weight adjustment &	various jobs to be carried out in the	
	stacking, lap transportation,machine	machine by the operator-color coding	
	cleaning, waste collection,patrolling	machine signals -check points- setting	

		quality-defects and remedies-wastes	
	WORK METHOD(chute feed)		
	material collectiion and feed,atted		
	faults,cleaing waste collection and		
	patrolling		
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
CARDING	WORKMETHOD(lap feed)		
OPERATOR	lap transportation ,lap replenishment,	objectives-machine parts and functions	1-10days
	can doffing, can transportation, sliver	passage of material machine operations	
	piecing,patrolling,machine cleaning	various jobs to be carried out in the	
	methods,attending faults,waste	machine by the operator-color coding	
	collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	WORK METHOD (chute feed)		
	can doffing,can transportatiion ,sliver		
	piecing,patrolling,machine cleaning		
	methods,attending faults,waste		
	collection		
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
COMBER	can and lap transportation ,can and	objectives-machine parts and functions	1-15 days
PREPARATORY	lap replenishment, sliver piecing,	passage of material machine operations	
OPERATORS	attend roller lapping,patrolling,lap	various jobs to be carried out in the	
	transportation,machine cleaning,	machine by the operator-color coding	
	attending faults ,waste collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	productiion,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
COMBER	lap transportation,lap replenishment	objectives-machine parts and functions	1-15days
OPERATOR	can transportation, can doffing ,sliver	passage of material machine operations	
	piecing,attend roller lapping,patrolling	various jobs to be carried out in the	
	machine cleaning,attending faults	machine by the operator-color coding	
	waste collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	

	production,defects,wastes,machine repairs, etc.	trainees about the production,defects waste, work methods, habits,minor repairs,etc	
DRAWFRAME OPERATOR	can transportation,can replenishment sliver piecing,can doffing,attend roller lapping,patrolling, machine cleaning attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
SIMPLEX OPERATOR	can transportation,can replenishment sliver piecing,can doffing,attend roller lapping,patrolling, machine cleaning attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15 days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
SPINNING OPERATOR	piecing,bobbin transportation,bobbin replenishment,gaiting,traveller changing attending roller lapping,patrolling, attending faults,waste collection and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90days
WINDING OPERATOR	cop changing,mending breaks,doffing cone transportation,patrolling,attending faults and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot drums to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
DOUBLING/TFC OPERATOR	break mending cheese transportation cheese replenishment,gaiting,traveller changing,patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding	1-15days

		machine signals -check points- setting	
		quality-defects and remedies-wastes	
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	production,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , ,BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

DEPARTMENT-SPINNING

ANNEXURE - 36

SHORT TERM COURSE CONTENT FOR DEPARTMENTAL INCHARGE

DEPARTMENT	PRACTICAL	THEORY	DAYS
BLOWROOM	WORK METHOD(LAP FEED)	objectives-machine parts and functions	1-15days
OPERATOR	material collection and feed ,attend	passage of material machine operations	
	faults, lap doffing,weight adjustment &	various jobs to be carried out in the	
	stacking, lap transportation,machine	machine by the operator-color coding	
	cleaning, waste collection,patrolling	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	WORK METHOD(chute feed)		
	material collectiion and feed,atted		
	faults,cleaning waste collection and		
	patrolling		
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	production,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
CARDING	WORKMETHOD(lap feed)		
OPERATOR	lap transportation ,lap replenishment,	objectives-machine parts and functions	1-10days
	can doffing, can transportation, sliver	passage of material machine operations	
	piecing,patrolling,machine cleaning	various jobs to be carried out in the	
	methods,attending faults,waste	machine by the operator-color coding	
	collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	
	WORK METHOD (chute feed)		
	can doffing,can transportatiion ,sliver		
	piecing,patrolling,machine cleaning		
	methods,attending faults,waste		
	collection		
	allot machine to each individual based		
	on the performance		
	to work independently on machines	discussion on the observation made by	16-60days
	and simultaneously monitoring the	the instructor and experience of the	
	production,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	
COMBER	can and lap transportation ,can and	objectives-machine parts and functions	1-15 days
PREPARATORY	lap replenishment, sliver piecing,	passage of material machine operations	
OPERATORS	attend roller lapping,patrolling,lap	various jobs to be carried out in the	
	transportation,machine cleaning,	machine by the operator-color coding	
	attending faults ,waste collection	machine signals -check points- setting	
		quality-defects and remedies-wastes	

	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
COMBER OPERATOR	lap transportation,lap replenishment can transportation, can doffing ,sliver piecing,attend roller lapping,patrolling machine cleaning,attending faults waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
DRAWFRAME OPERATOR	can transportation,can replenishment sliver piecing,can doffing,attend roller lapping,patrolling, machine cleaning attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-10 days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
SIMPLEX OPERATOR	can transportation,can replenishment sliver piecing,can doffing,attend roller lapping,patrolling, machine cleaning attending faults,waste collection	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15 days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
SPINNING OPERATOR	piecing,bobbin transportation,bobbin replenishment,gaiting,traveller changing attending roller lapping,patrolling, attending faults,waste collection and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine	discussion on the observation made by the instructor and experience of the trainees about the production,defects	16-90days

	repairs, etc.	waste, work methods, habits, minor repairs, etc	
WINDING OPERATOR	cop changing, mending breaks, doffing cone transportation, patrolling, attending faults and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot drums to each individual based on the performance	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-60days
DOUBLING/TFC OPERATOR	break mending cheese transportation cheese replenishment, gaiting, traveller changing, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-60days

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

DEPARTMENT-WEAVING

ANNEXURE - 37

SHORT TERM COURSE CONTENT FOR SKILLED WORKERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
WARPING OPERATOR	supply package transportation, supply package replenishment, beam doffing and transportation, break mending, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-60days
SIZING OPERATOR	beam transportation, beam loading in creel attend lapping ,leasing, beam doffing , various testing and testing procedures, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance	discussion on the observation made by the instructor and experience of the	16-60days

	production,defects,wastes,machine repairs, etc.	trainees about the production,defects waste, work methods, habits,minor repairs,etc	
DRAWING-IN OPERATOR	beam transportation,heald shafts and reed handling, stand fixing /dismangling methods pattern/design knowledge , drawing and denting of ends and cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting	
	allot jobs to each individual based on the performance	quality-defects and remedies-wastes	
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
LOOM-SHED OPERATOR	attending warp and weft breaks ,cone transportation and replenishment,patrol & inspect beams,cloth defects and rectification cleaning methods	objectives-machine parts and functions passage of material-primary motions like shedding,picking,and beating secondary motions like let-off ,take-up and auxiliary motions like warp/weft stop motions,brake and driving mechanisms	
	allot looms to each individual based on the performance	loom operations,various jobs carried out in loom by the operator,colour coding loom signals,set points,settings,quality defects and remedies,wastes.	
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90days
BEAM GAITING KNOTTING	beam transportation,arranging knotting stand dress warp ends, knotting and gaiting operations,inspect beams,run loom after gaiting,cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting	
	allot work to each individual based on the performance	quality-defects and remedies-wastes	
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days

DEPARTMENT-WEAVING

ANNEXURE - 38

SHORT TERM COURSE CONTENT FOR OPERATIVES

DEPARTMENT	PRACTICAL	THEORY	DAYS
WARPING OPERATOR	supply package transportation,supply package replenishment,beam doffing and transportaion,break mending,patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting	1-15days
	allot machine to each individual based on the performance	quality-defects and remedies-wastes	

	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
SIZING OPERATOR	beam transportation,beam loading in creel attend lapping ,leasing,beam doffing ,various testing and testing procedures,patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
DRAWING-IN OPERATOR	beam transportation,heald shafts and reed handling, stand fixing /dismangling methods pattern/design knowledge , drawing and denting of ends and cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	allot jobs to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
LOOM-SHED OPERATOR	attending warp and weft breaks ,cone transportation and replenishment,patrol & inspect beams,cloth defects and rectification cleaning methods	objectives-machine parts and functions passage of material-primary motions like shedding,picking,and beating secondary motions like let-off ,take-up and auxiliary motions like warp/weft stop motions,brake and driving mechanisms loom operations,various jobs carried out in loom by the operator,colour coding loom signals,set points,settings,quality defects and remedies,wastes.	
	allot looms to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90days
BEAM GAITING KNOTTING	beam transportation,arranging knotting stand dress warp ends, knotting and gaiting operations,inspect beams,run loom after gaiting,cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	allot work to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the	discussion on the observation made by the instructor and experience of the	16-60days

	production,defects,wastes,machine	trainees about the production,defects	
	repairs, etc.	waste, work methods, habits,minor	
		repairs,etc	

DEPARTMENT-WEAVING**ANNEXURE - 39****SHORT TERM COURSE CONTENT FOR FITTERS,JOBBER AND TECHNICIANS**

DEPARTMENT	PRACTICAL	THEORY	DAYS
WARPING OPERATOR	supply package transportation, supply package replenishment, beam doffing and transportation, break mending, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
SIZING OPERATOR	beam transportation, beam loading in creel attend lapping ,leasing, beam doffing , various testing and testing procedures, patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
DRAWING-IN OPERATOR	beam transportation, heald shafts and reed handling, stand fixing /dismantling methods pattern/design knowledge , drawing and denting of ends and cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	allot jobs to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
LOOM-SHED OPERATOR	attending warp and weft breaks , cone transportation and replenishment, patrol & inspect beams, cloth defects and rectification cleaning methods	objectives-machine parts and functions passage of material-primary motions like shedding, picking, and beating secondary motions like let-off ,take-up and auxiliary motions like warp/weft stop motions, brake and driving mechanisms loom operations, various jobs carried out in loom by the operator, colour coding loom signals, set points, settings, quality defects and remedies, wastes.	
	allot looms to each individual based on the performance		

	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90days
BEAM GAITING	beam transportation,arranging knotting stand	objectives-machine parts and functions	
KNOTTING	dress warp ends, knotting and gaiting	passage of material machine operations	
	operations,inspect beams,run loom after gaiting,cleaning methods	various jobs to be carried out in the machine by the operator-color coding	
		machine signals -check points- setting	
	allot work to each individual based on the performance	quality-defects and remedies-wastes	
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days

DEPARTMENT-WEAVING

ANNEXURE - 40

SHORT TERM COURSE CONTENT FOR SUPERVISORS

DEPARTMENT	PRACTICAL	THEORY	DAYS
WARPING OPERATOR	supply package transportation,supply package replenishment,beam doffing and transportaion,break mending,patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
SIZING OPERATOR	beam transportation,beam loading in creel attend lapping ,leasing,beam doffing ,various testing and testing procededures,patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
DRAWING-IN OPERATOR	beam transportation,heald shafts and reed handling, stand fixing /dismangling methods pattern/design knowledge , drawing and denting of ends and cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	allot jobs to each individual based on the performance		

	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
LOOM-SHED OPERATOR	attending warp and weft breaks ,cone transportation and replenishment,patrol & inspect beams,cloth defects and rectification cleaning methods	objectives-machine parts and functions passage of material-primary motions like shedding,picking,and beating secondary motions like let-off ,take-up and auxiliary motions like warp/weft stop motions,brake and driving mechanisms	
	allot looms to each individual based on the performance	loom operations,various jobs carried out in loom by the operator,colour coding loom signals,set points,settings,quality defects and remedies,wastes.	
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90days
BEAM GAITING KNOTTING	beam transportation,arranging knotting stand dress warp ends, knotting and gaiting operations,inspect beams,run loom after gaiting,cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	
	allot work to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days

DEPARTMENT-WEAVING

ANNEXURE - 41

SHORT TERM COURSE CONTENT FOR DEPARTMENTAL INCHARGE

DEPARTMENT	PRACTICAL	THEORY	DAYS
WARPING OPERATOR	supply package transportation,supply package replenishment,beam doffing and transportaion,break mending,patrolling and machine cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting quality-defects and remedies-wastes	1-15days
	allot machine to each individual based on the performance		
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
SIZING OPERATOR	beam transportation,beam loading in creel attend lapping ,leasing,beam doffing ,various testing and testing procededures,patrolling and	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the	1-15days

	machine cleaning methods	machine by the operator-color coding	
		machine signals -check points- setting	
	allot machine to each individual based on the performance	quality-defects and remedies-wastes	
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
DRAWING-IN OPERATOR	beam transportation,heald shafts and reed handling, stand fixing /dismangling methods pattern/design knowledge , drawing and denting of ends and cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting	
	allot jobs to each individual based on the performance	quality-defects and remedies-wastes	
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days
LOOM-SHED OPERATOR	attending warp and weft breaks ,cone transportation and replenishment,patrol & inspect beams,cloth defects and rectification cleaning methods	objectives-machine parts and functions passage of material-primary motions like shedding,picking,and beating secondary motions like let-off ,take-up and auxiliary motions like warp/weft stop motions,brake and driving mechanisms	
	allot looms to each individual based on the performance	loom operations,various jobs carried out in loom by the operator,colour coding loom signals,set points,settings,quality defects and remedies,wastes.	
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90days
BEAM GAITING KNOTTING	beam transportation,arranging knotting stand dress warp ends, knotting and gaiting operations,inspect beams,run loom after gaiting,cleaning methods	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-color coding machine signals -check points- setting	
	allot work to each individual based on the performance	quality-defects and remedies-wastes	
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-60days

DEPARTMENT-KNITTING

ANNEXURE - 42

SHORT TERM COURSE CONTENT FOR SKILLED WORKERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
KNITTING	type of machine.replenishing supply	objectives-machine parts and functions	1-15days

	package,break mending,cloth roll cutting	passage of material machine operations	
	transportation sampling procedure	various jobs to be carried out in the	
	attending various faults occurring in machine,	machine by the operator-color coding	
	cleaning methods,oiling to various parts	machine signals -check points- setting	
	machine monitoring	quality-defects and remedies-wastes	
	allot work to each individual based	discussion on the observation made by	16-60days
	on the performance	the instructor and experience of the	
		trainees about the production,defects	
	to work independently on machines	waste, work methods, habits,minor	
	and simultaneously monitoring the	repairs,etc	
	production,defects,wastes,machine		
	repairs, etc.		

DEPARTMENT-KNITTING

ANNEXURE - 43

SHORT TERM COURSE CONTENT FOR OPERATIVES

DEPARTMENT	PRACTICAL	THEORY	DAYS
KNITTING	type of machine.replenishing supply	objectives-machine parts and functions	1-15days
	package,break mending,cloth roll cutting	passage of material machine operations	
	transportation sampling procedure	various jobs to be carried out in the	
	attending various faults occurring in machine,	machine by the operator-color coding	
	cleaning methods,oiling to various parts	machine signals -check points- setting	
	machine monitoring	quality-defects and remedies-wastes	
	allot work to each individual based	discussion on the observation made by	16-60days
	on the performance	the instructor and experience of the	
		trainees about the production,defects	
	to work independently on machines	waste, work methods, habits,minor	
	and simultaneously monitoring the	repairs,etc	
	production,defects,wastes,machine		
	repairs, etc.		

DEPARTMENT-KNITTING

ANNEXURE - 44

SHORT TERM COURSE CONTENT FOR FITTERS,JOBBER,TECHNICIANS

DEPARTMENT	PRACTICAL	THEORY	DAYS
KNITTING	type of machine.replenishing supply	objectives-machine parts and functions	1-15days
	package,break mending,cloth roll cutting	passage of material machine operations	
	transportation sampling procedure	various jobs to be carried out in the	
	attending various faults occurring in machine,	machine by the operator-color coding	
	cleaning methods,oiling to various parts	machine signals -check points- setting	
	machine monitoring	quality-defects and remedies-wastes	
	allot work to each individual based	discussion on the observation made by	16-60days
	on the performance	the instructor and experience of the	
		trainees about the production,defects	
	to work independently on machines	waste, work methods, habits,minor	
	and simultaneously monitoring the	repairs,etc	
	production,defects,wastes,machine		
	repairs, etc.		

DEPARTMENT-KNITTING

ANNEXURE - 45

SHORT TERM COURSE CONTENT FOR SUPERVISORS

DEPARTMENT	PRACTICAL	THEORY	DAYS
KNITTING	type of machine.replenishing supply	objectives-machine parts and functions	1-15days
	package,break mending,cloth roll cutting	passage of material machine operations	
	transportation sampling procedure	various jobs to be carried out in the	
	attending various faults occurring in machine,	machine by the operator-color coding	

	cleaning methods,oiling to various parts	machine signals -check points- setting	
	machine monitoring	quality-defects and remedies-wastes	
	allot work to each individual based on the performance	discussion on the observation made by the instructor and experience of the trainees about the production,defects	16-60days
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	waste, work methods, habits,minor repairs,etc	

DEPARTMENT-KNITTING

ANNEXURE - 46

SHORT TERM COURSE CONTENT FOR DEPARTMENTAL INCHARGE

DEPARTMENT	PRACTICAL	THEORY	DAYS
KNITTING	type of machine.replenishing supply	objectives-machine parts and functions	1-15days
	package,break mending,cloth roll cutting	passage of material machine operations	
	transportation sampling procedure	various jobs to be carried out in the	
	attending various faults occurring in machine,	machine by the operator-color coding	
	cleaning methods,oiling to various parts	machine signals -check points- setting	
	machine monitoring	quality-defects and remedies-wastes	
	allot work to each individual based on the performance	discussion on the observation made by the instructor and experience of the trainees about the production,defects	16-60days
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	waste, work methods, habits,minor repairs,etc	

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , , BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

DEPARTMENT-PROCESSING

ANNEXURE - 47

SHORT TERM COURSE CONTENT FOR SKILLED WORKERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
SCOURING AND BLEACHING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals	1-15days
	lot change,patrolling and continuous monitoring,machine cleaning and oiling	testing instruments and testing methods chemical and their usage-check points-	
	allot work to each individual based on the performance	settings -quality-defects and remedies-waste control	
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90 days
DYEING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals	1-15days
	lot change,patrolling and continuous monitoring,machine cleaning and oiling	testing instruments and testing methods dye chemicals and their usage-	
	allot work to each individual based on the performance	settings -quality-defects and remedies-waste control	

	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs,unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90 days
PRINTING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitoring,machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs,unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90 days
FINISHING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitoring,machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs,unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90 days

DEPARTMENT-PROCESSING

ANNEXURE - 48

SHORT TERM COURSE CONTENT FOR OPERATIVES

DEPARTMENT	PRACTICAL	THEORY	DAYS
SCOURING AND BLEACHING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitoring,machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemical and their usage-check points- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90 days
DYEING	supply/finished material transportation, loading/machineadjustment for varying	objectives-machine parts and functions passage of material machine operations	1-15days

	work conditions, sample collection and testing methods, chemical weighing and preparation	various jobs to be carried out in the machine by the operator-machine signals	
	lot change, patrolling and continuous monitoring, machine cleaning and oiling	testing instruments and testing methods dye chemicals and their usage-	
	allot work to each individual based on the performance	settings -quality-defects and remedies-waste control	
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-90 days
PRINTING	supply/finished material transportation, loading/machine adjustment for varying	objectives-machine parts and functions passage of material machine operations	1-15days
	work conditions, sample collection and testing methods, chemical weighing and preparation	various jobs to be carried out in the machine by the operator-machine signals	
	lot change, patrolling and continuous monitoring, machine cleaning and oiling	testing instruments and testing methods dye chemicals and their usage-	
	allot work to each individual based on the performance	settings -quality-defects and remedies-waste control	
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-90 days
FINISHING	supply/finished material transportation, loading/machine adjustment for varying	objectives-machine parts and functions passage of material machine operations	1-15days
	work conditions, sample collection and testing methods, chemical weighing and preparation	various jobs to be carried out in the machine by the operator-machine signals	
	lot change, patrolling and continuous monitoring, machine cleaning and oiling	chemicals and their usage-	
	allot work to each individual based on the performance	settings -quality-defects and remedies-waste control	
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-90 days

DEPARTMENT-PROCESSING

ANNEXURE - 49

SHORT TERM COURSE CONTENT FOR FITTERS, JOBBERS AND TECHNICIANS

DEPARTMENT	PRACTICAL	THEORY	DAYS
SCOURING AND BLEACHING	supply/finished material transportation, loading/machine adjustment for varying	objectives-machine parts and functions passage of material machine operations	1-15days
	work conditions, sample collection and testing methods, chemical weighing and preparation	various jobs to be carried out in the machine by the operator-machine signals	
	lot change, patrolling and continuous monitoring, machine cleaning and oiling	testing instruments and testing methods chemical and their usage-check points-	
	allot work to each individual based on the performance	settings -quality-defects and remedies-waste control	
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-90 days

DYEING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-90 days
PRINTING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-90 days
FINISHING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-90 days

DEPARTMENT-PROCESSING

ANNEXURE - 50

SHORT TERM COURSE CONTENT FOR SUPERVISORS

DEPARTMENT	PRACTICAL	THEORY	DAYS
SCOURING AND BLEACHING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemical and their usage-check points- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, etc.	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor	16-90 days

		repairs,etc	
DYEING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitoring,machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs,unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90 days
PRINTING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitoring,machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs,unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90 days
FINISHING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitoring,machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine repairs,unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production,defects waste, work methods, habits,minor repairs,etc	16-90 days

DEPARTMENT-PROCESSING

ANNEXURE - 51

SHORT TERM COURSE CONTENT FOR DEPARTMENTAL INCHAGRE

DEPARTMENT	PRACTICAL	THEORY	DAYS
SCOURING AND BLEACHING	supply/finished material transportation, loading/machineadjustment for varying work conditions,sample collection and testing methods,chemical weighing and preparation lot change,patrolling and continuous monitoring,machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemical and their usage-check points- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production,defects,wastes,machine	discussion on the observation made by the instructor and experience of the trainees about the production,defects	16-90 days

	repairs, etc.	waste, work methods, habits, minor repairs, etc	
DYEING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-90 days
PRINTING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods dye chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-90 days
FINISHING	supply/finished material transportation, loading/machine adjustment for varying work conditions, sample collection and testing methods, chemical weighing and preparation lot change, patrolling and continuous monitoring, machine cleaning and oiling allot work to each individual based on the performance	objectives-machine parts and functions passage of material machine operations various jobs to be carried out in the machine by the operator-machine signals testing instruments and testing methods chemicals and their usage- settings -quality-defects and remedies- waste control	1-15days
	to work independently on machines and simultaneously monitoring the production, defects, wastes, machine repairs, unloading material in machine	discussion on the observation made by the instructor and experience of the trainees about the production, defects waste, work methods, habits, minor repairs, etc	16-90 days

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

DEPARTMENT-GARMENTS

ANNEXURE - 52

SHORT TERM COURSE CONTENT FOR SKILLED WORKERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
SEWING M/C	cutting and marking ,stitching, hand stitches back stitch ,basting, button hole stitch, chain stitch, hand hemming stitch, button hemming curves and guiding fabrics, pressing, threading bobbin preparation , tension adjustment cleaning methods ,oiling and maintenance	objectives-machine parts and functions machine operations, various jobs to be carried out in the machine by the worker-check points-setting-quality-defects and remedies-waste control	1-15days
	to work independently on machine and simultaneously monitoring the production	discussion on the observation made by the instructor and experience of the	16-90 days

	defects , wastes , machine repairs etc.,	trainees about the production,defects	
		waste, work methods, habits,minor	
		repairs,etc	

DEPARTMENT-GARMENTS**ANNEXURE - 53****SHORT TERM COURSE CONTENT FOR OPERATIVES**

DEPARTMENT	PRACTICAL	THEORY	DAYS
SEWING M/C	cutting and marking ,stitching,hand stitches	objectives-machine parts and functions	1-15days
	back stitch ,basting,button hole stitch,chain	machine operations,various jobs to be	
	stitch,hand hemming stitch,button hemming	carried out in the machine by the	
	curves and guiding fabrics,pressing,threading	worker-check points-setting-quality-	
	bobbin preparation , tension adjustmnet	defects and remedies-waste control	
	cleaning methods ,oiling and maintenance		
	to work independently on machine and	discussion on the observation made by	16-90 days
	simultaneously monitoring the production	the instructor and experience of the	
	defects , wastes , machine repairs etc.,	trainees about the production,defects	
		waste, work methods, habits,minor	
		repairs,etc	

DEPARTMENT-GARMENTS**ANNEXURE - 54****SHORT TERM COURSE CONTENT FOR FITTERS , JOBBERS AND TECHNICIANS**

DEPARTMENT	PRACTICAL	THEORY	DAYS
SEWING M/C	cutting and marking ,stitching,hand stitches	objectives-machine parts and functions	1-15days
	back stitch ,basting,button hole stitch,chain	machine operations,various jobs to be	
	stitch,hand hemming stitch,button hemming	carried out in the machine by the	
	curves and guiding fabrics,pressing,threading	worker-check points-setting-quality-	
	bobbin preparation , tension adjustmnet	defects and remedies-waste control	
	cleaning methods ,oiling and maintenance		
	to work independently on machine and	discussion on the observation made by	16-90 days
	simultaneously monitoring the production	the instructor and experience of the	
	defects , wastes , machine repairs etc.,	trainees about the production,defects	
		waste, work methods, habits,minor	
		repairs,etc	

DEPARTMENT-GARMENTS**ANNEXURE - 55****SHORT TERM COURSE CONTENT FOR SUPERVISORS**

DEPARTMENT	PRACTICAL	THEORY	DAYS
SEWING M/C	cutting and marking ,stitching,hand stitches	objectives-machine parts and functions	1-15days
	back stitch ,basting,button hole stitch,chain	machine operations,various jobs to be	
	stitch,hand hemming stitch,button hemming	carried out in the machine by the	
	curves and guiding fabrics,pressing,threading	worker-check points-setting-quality-	
	bobbin preparation , tension adjustmnet	defects and remedies-waste control	
	cleaning methods ,oiling and maintenance		
	to work independently on machine and	discussion on the observation made by	16-90 days
	simultaneously monitoring the production	the instructor and experience of the	
	defects , wastes , machine repairs etc.,	trainees about the production,defects	
		waste, work methods, habits,minor	
		repairs,etc	

DEPARTMENT-GARMENTS**ANNEXURE - 56****SHORT TERM COURSE CONTENT FOR DEPARTMENTAL INCHARGE**

DEPARTMENT	PRACTICAL	THEORY	DAYS
SEWING M/C	cutting and marking ,stitching,hand stitches	objectives-machine parts and functions	1-15days
	back stitch ,basting,button hole stitch,chain	machine operations,various jobs to be	
	stitch,hand hemming stitch,button hemming	carried out in the machine by the	
	curves and guiding fabrics,pressing,threading	worker-check points-setting-quality-	

	bobbin preparation , tension adjustmnet	defects and remedies-waste control	
	cleaning methods ,oiling and maintenance		
	to work independently on machine and	discussion on the observation made by	16-90 days
	simultaneously monitoring the production	the instructor and experience of the	
	defects , wastes , machine repairs etc.,	trainees about the production,defects	
		waste, work methods, habits,minor	
		repairs,etc	

THE COURSE CONTENT IS SAME FOR ALL CATEGORIES , ,BUT THE TEACHING LEVEL WILL VARY ACCORDING TO PERSONS

DEPARTMENT-SPINNING

ANNEXURE - 57

SHORT TERM COURSE CONTENT FOR PREPARATORY FITTERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
Spinning preparatory	Various Gears, Bevels , Belts, Bearings and tool kids , cleaning check points , motor pulley and machine pulley fittings , greasing and oiling techniques to various bearings	objectives-machine parts and functions machine operations,various jobs to be carried out in the machine by the worker-check points-setting-quality-defects and remedies-waste control	1-90 days
	Maintenance of cage , condenser , grid bars limit switch , length measuring motion , PIV Gears , Air Pressure check up , Half and Full setting , machine speed and setting wire points, index wheel settings , cots buffing technique,pnuemafil fan suction and net check up , draft roller setting, top arm pressure checking , false twister , spacer and condenser check up		
Spinning Fitter	Various Gears, Bevels , Belts, Bearings and tool kids , cleaning check points , motor pulley and machine pulley fittings , greasing and oiling techniques to various bearings	objectives-machine parts and functions machine operations,various jobs to be carried out in the machine by the worker-check points-setting-quality-defects and remedies-waste control	1-90 days
	Spindle gauge ,drafting roller setting, top arm pressure gauge, lappet gauge, change gears, draft twist , ratchet and break draft, idle spindle oil topping changing traveller, clearer setting cots buffing technique and trouble shooting		
Post spinning fitters	Various Gears, Bevels , Belts, Bearings and tool kids , cleaning check points , motor pulley and machine pulley fittings , greasing and oiling techniques to various bearings	objectives-machine parts and functions machine operations,various jobs to be carried out in the machine by the worker-check points-setting-quality-defects and remedies-waste control	1-90 days
	Belt check up , drum pulley, drum pulley alignment , rotary setting and check up, splicer mechanical setting ,length measuring motion check up , splicer mechanical set up,length measuring motion check up , OHC mechanical setting , Allot machine to each individual based on the performance		

DEPARTMENT-WEAVING

ANNEXURE - 58

SHORT TERM COURSE CONTENT FOR WEAVING FITTERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
Preparatory fitter	Gearing arrangement , stop motion functions drive and drive controls , cleaning , check poin greasing techniques to various bearings,	objectives-machine parts and functions machine operations,various jobs to be carried out in the machine by the	1-90 days

	stop motion functions	worker-check points-setting-quality-defects and remedies-waste control	
	Drive direction , control valve, pneumatic and hydraulic break, length and speed control,doffing system , winding ,binding coil setting , reserve bunch setting, control valves		
Loom Shed fitter	Gearing arrangement , stop motion functions	objectives-machine parts and functions	1-90 days
	drive and drive controls , cleaning , check point greasing techniques to various bearings, stop motion functions	machine operations,various jobs to be carried out in the machine by the worker-check points-setting-quality-defects and remedies-waste control	
	Knotting , Gaiting, primary and secondary motion settings with reference to sley position, PPI settings, auxillary mechanism and setting,timing diagram of various looms,card punching for drop box looms,jacquard,cam throw and harness setting loom break function, projectile conveyor setting warp tension setting,essential setting,rapier setting Airjet and air insertion and solenoid valve setting		

DEPARTMENT-KNITTING

ANNEXURE - 59

SHORT TERM COURSE CONTENT FOR KNITTING FITTERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
Knitting m/c fitter	Stop motion functions, drive and brake control cleaning check points,greasing techniques to various bearings	objectives-machine parts and functions machine operations,various jobs to be carried out in the machine by the worker-check points-setting-quality-defects and remedies-waste control	1-90 days
	single jersey,rib knitting,rib jacquard,interlock r knitting machine maintenance,needle and sink setting,motor and machine pulley setting selection of cam tracks.feeding mechanism,maintain speed and gauge of machine ,timing diagram,dial and cylinder setting,cylinder and dial cam maintenance pattern wheel and pattern drum,program tape, warp knitting m/c,socks knitting m/c maintenance and different settings.		

DEPARTMENT-PROCESSING

ANNEXURE - 60

SHORT TERM COURSE CONTENT FOR PROCESSING FITTERS

DEPARTMENT	PRACTICAL	THEORY	DAYS
scouring and bleaching fitter	passage of cloth,stop motion functions,drive and brake controls ,cleaning check points,greasing techniques to various bearings	objectives-machine parts and functions machine operations,various jobs to be carried out in the machine by the worker-check points-setting-quality-defects and remedies-waste control	1-90 days
	machine schedule maintenance,preventive and predictive maintenance,roller to mangle cleara settings,trouble shooting,heating elements and pressure valve checking,safety device maintenance ,control panel display,maintenance of tension rollers,spurt pipes,different machine steam water temperature control valve maintenance		
Dyeing fitter	passage of cloth,stop motion functions,drive and brake controls ,cleaning check points,greasing techniques to various bearings	objectives-machine parts and functions machine operations,various jobs to be carried out in the machine by the worker-check points-setting-quality-defects and remedies-waste control	1-90 days
	machine schedule maintenance,preventive and predictive maintenance,roller to mangle cleara settings,trouble shooting,heating elements and pressure valve checking,safety device maintenance ,control panel display,maintenance of		

	tension rollers,spurt pipes,diffrent machine steam	
	water temperature control valve maintenance	

DEPARTMENT-GARMENT**ANNEXURE - 61****SHORT TERM COURSE CONTENT FOR GARMENT FITTERS**

DEPARTMENT	PRACTICAL	THEORY	DAYS
Garment m/c	pattern making tools,marker plan,different cutt	objectives-machine parts and functions	1-90 days
fitter	machines,straight band,die &laser,conveyor	machine operations,various jobs to be	
	maintenance	carried out in the machine by the	
	single needle,overlock,patlock machines	worker-check points-setting-quality-	
	needle bar and presser foot adjustment,feed d	defects and remedies-waste control	
	movement,gear setting.sitch length and tension		
	adjustment,looper setting,time setting between		
	looper and needle,button hole gear setting,stitch		
	length adjustment,types of stitches and seams,		
	pressing and packing maintenance		

DEPARTMENT	PRACTICAL	THEORY	DAYS
SPINNING	Various gears, bevels, belts, bearings and tool kits cleaning check points, half and full setting, PIV gears cots buffing techniques pneumafil functions, top arm pressure checking etc.,	Introduction to wool fibre, fibre morphology, characteristics wool grading, spinning method, weaving and knitting method, processing method, garmenting.	1-15 days
WEAVING	Gearing arrangements, stop motion function machine maintenance, drive and brake controls, cleaning check points, greasing techniques to various bearing, drive direction control, pneumatic and hydraulic brake, reserve bunch setting and tension control.	Objectives- machine parts and functions- passage of amterial machine operations- various jobsto be carried out in machine by fitter machine signals- check points settings quality and defects and remedies and waste control	16-30 days
KNITTING	Stop motion function machine maintenance, drive and brake controls, greasing techniques of various bearings knitting machine maintenance needle and sinker setting types of guage, warp knitting and socks knitting m/c maintenance		31-45 days
PROCESSING	Passage of material, stop motion functions, drive and brake controls, m/c schedule maintenance trouble shooting, heating element and pressure wall check up, safety device maintenance, control panel display		46-60 days
GARMENTING	Pattern making tools, marker plan, different cutting machine straight and bend knife maintenance, conveyor maintenance, single needle flatlock, overlock machine maintenance, looper setting stitch length adjustment pressing and packing m/c maintenance		61-90 days

TRADE: TEXTILE CHEMICAL PROCESSING

Orientation Course for Technicians in Chemical Processing Department of a Textile unit.

Important considerations

- In the present set-up, various sections of a chemical processing unit have got colour mixers, machine operators, helpers etc. who look after the work of chemical and colour preparation and operation of machines etc. This section of work force requires upgradation of knowledge in their area itself.
- For attending to machine faults there is a separate department called maintenance dept. comprising of qualified fitters, electricians, wiremen, blacksmith etc. headed by qualified engineers of various level. When there is a fault on any machine, the maintenance dept. is approached and an appropriate technician is summoned to attend to the fault.
- A small units may not have a full fledged maintenance dept. but they have to keep a fitter, electrician etc. on full time or part time basis or out source them as and when there is need.
- In view of the above a full fledged long term courses for technicians in chemical processing dept. may not be necessary. Two to Three weeks orientation course about machinery and process in chemical processing dept., to the qualified fitters (having National Trade Certificate from ITI) is sufficient. Of-course they should under go a week in Plant Training during such short term orientation programmes. For electrician such type of orientation may not be required since there is not much variation in electric connection etc. in textile processing units vis-à-vis other sectors. For electricians two to three days programme is sufficient
- The curriculum for **2(two) / 3 (three) weeks** orientation course could be as under :

Sr. No.	Day	Subject - Item		Units
		Theory	Practice	
1.	1	Objective of processing a textile product, various textile processes.	--	6
2.	2	Various textile processing machines	--	6
3.	3	--	Exposure visit to show various textile machines	6

4.	4	Various driving systems, gears, belts, pitch settings, calculation of speed ratio of different types of gears, belt length calculation pertaining to textile processing machine.	Identification of different gears, Speed calculations, Length of belt calculations, Engaging gears, Tensioning various belts, pertaining to textile processing machines.	3 + 3
5.	5	-do-	-do-	-do-
6.	6	Bearings, Pneumatics, Motors used in Textile Processing Units.	Identification, fitting and measurement of bearings, pressure adjustments in valves & regulators, cleaning of filters, regulators, settings of pistons, recognition of motors, greasing & maintenance with reference to textile Processing Machines.	3 + 3
7.	7	--	--	--
8.	8	Understanding different types of rollers viz. padding rollers, impregnating rollers, squeezing, guide rollers etc. in textile processing machines.	Greasing and balancing of different type of rollers in textile processing machines.	3 + 3
9.	9	-do-	-do-	-do-
10.	10	Various types of pumps, nozzles, valves and indicators in textile processing machines.	Greasing, setting and cleaning of pumps, nozzles, valves, cleaning of false bottom, indicator etc. in textile processing machines.	3 + 3
11	11	Various types of safety devices, controls, expanders, spirt pipes, Winch mechanisms, HTHP systems	Maintenance and fault correction of these gadgets.	3 + 3

12	12	Various type of drying mechanisms such as those used in high frequency dryers, steam dryers, electrical dryers, oil-heated dryers, in textile processing units.	Maintenance and fault correction of these gadgets.	3 + 3
13	13	Understanding printing and finishing machines and accessories. Understanding the concepts of quality control and assurance.	--	3 + 3
14	14	One Week in Plant training	To be inducted in between as convenient for the programme	

**Orientation Course for Operatives in Chemical Processing Department of a
Textile unit.**

Important considerations

- In the present set-up, various sections of a chemical processing unit have got colour mixers, machine operators, helpers etc. who look after the work of chemical and colour preparation and operation of machines etc. This section of work force requires upgradation of knowledge in their area itself.
- For attending to machine faults there is a separate department called maintenance dept. comprising of qualified fitters, electricians, wiremen, blacksmith etc. headed by qualified engineers of various level, when there is a fault on any machine, the maintenance dept. is approached and an appropriate technician is summoned to attend to the fault.
- A small units may not have a full fledged maintenance dept. but they have to keep a fitter, electrician etc. and full time / part time basis or have to out source them as and when there is need.
- In view of the above a full fledged course for producing technician in chemical processing dept. may not be necessary. What is required is to give a six months having qualification 10 + 2, and orientation course in machinery and process in chemical processing dept. The programme will help to the industry to appoint shop floor staff with adequate knowledge of processing machines and its functions.

The curriculum for six months course could be as under :

Sr. No.	Practical and Theory	No. of Duration (Days)
1.	Fitting a. Filing Practice : b. Filing to size and chipping c. Marking and Punching d. Open fitting of sized metals e. Scrapping to rough and size f. Internal Fitting, Drilling & Fitting g. Grinding practice h. Snap gauge filing	Total : 8 Days
2.	Turning a. Tool grinding - tool setting & job setting b. Facing and chamfering c. Different types of shoulder and small radius turning d. Tapper turning and simple thread forming	Total : 4 Days
3.	Sheet Metal Work	Total : 2 Days

4.	Welding	Total : 2 Days
5.	Carpentry	Total : 2 Days
6.	Electrical	Total : 2 Days
7.	Electronics	Total : 2 Days
8.	Bearing, Pneumatics, Motors used in Textile Processing Units	Total : 6 Days
9.	Orientation to Fabrics (fibre, yarn and blends used, grading system)	Total : 2 Days
10.	Process Sequence (desizing, scouring, bleaching, mercerizing, dyeing printing & finishing - objectives & their importance)	Total : 2 Days
11.	Schedule of maintenance	Total : 2 Days
12.	Desizing (Importance, chemical use, method of desizing various sizing machines, maintenance schedule of various parts of the machines, trouble shooting in desizing machine, remedial action for various fabrics defects in desizing)	Total : 6 Days
13.	Scouring : Purpose - importance - chemicals used - methods of scouring - various machines used Jigger & their types, kinds of heating elements, Kiers & their types)	Total : 3 Days
14.	Maintenance of open & closed Jiggers, Vertical & Horizontal Kiers, various types of Heating elements & Pressure valves	Total 3 Days
15.	Purpose and maintenance of Safety devices - Pressure release valves - door safety switches - temperature controls - control panel display	Total : 6 Days
16.	Trouble shooting with remedial actions for various fabric defects in scouring - corrective & preventive measures	Total : 3 Days
17.	Bleaching : Purpose - importance chemical used - various methods & machines and heating elements, calculation of efficiency of machine, delivery rate and time duration.	Total : 3 Days
18.	Maintenance of the bleaching machineries, setting of pressure, timings, PH levels, External pump operations, spray nozzles, inspection of valves and liquid level indicators.	Total : 6 Days
19.	Trouble shooting in bleaching machine - over and under bleaching - reasons & remedies actions for various defects in bleaching.	Total : 2 Days

20.	Mercerdising : Purpose - important chemical used - chain & chainless machines, measuring efficiency, various calculations.	Total : 2 Days
21.	Maintenance of the mercerising machineries, setting of cloth tension, timings, PH levels, rollers greasing, balancing of rollers and checking of various valves.	Total : 6 Days
22.	Functions & maintenance of Expanders & their types – Tension	Total : 3 Days
23.	Purpose and maintenance of safety devices - door safety switches - control panel display	Total : 3 Days
24.	Trouble shooting in mercerising machines - PH variation - Tension variation - reasons & remedies	Total : 3 Days
25.	Dyeing : Purpose - importance - Classification of dyes - Direct - Vat - Mordant - Reactive dyes	
26.	Applications of various dyes according to the fabric material used & their mechanisms	
27.	Salient feature of various dyeing machines - Softlow - winch- HTHP - Beam dyers - Horizontal & Vertical types	
28.	Maintenance of various dyeing machines - Soft flow - Winch - HTHP - Beam dyers	
29.	Purpose and maintenance of Safety devices - Pressure switches - door safety switches - temperature controls - Electronics control panel display employed in various dyeing machines	
30.	Trouble shootings in various dyeing machines - PH variation - time variation - shade variations reasons & remedies	
31.	Drying machines - Hydro extractors - RF dryers - purpose & functions	
32.	Maintenance of drying machines - RF dryers - Hydro extractors	
33.	Purpose and maintenance of safety devices - door safety switches - temperature controls - electronic control panel display employed in various dyeing machines	
34.	Trouble shooting in various drying machines - time variation - reasons & remedies	
35.	Printing : Styles & types of printing - Direct - Resist - Discharge effects - Printing chemicals used for various types of fabrics - Procedure for various printing techniques	
36.	Printing machines : Roller - Rotary - Screen - Flat - Cylindrical - m/cs.	
37.	Maintenance of various printing m/c - Roller -	

	Rotary - Screen- Flat-Cylindrical - m/cs.	
38.	Trouble shootings in various printing machines - print variations - reasons & remedies	
39.	Finishing : Types of finishing - Temporary & Permenant - mechanical & chemical - Important finish applications	

40.	Maintenance of various finishing machines : Calenders - Padding mangles - dummy dodd & petty dodd machines - Stenters - felt calendars - raising machines	
41.	Quality Assurance : Concepts of quality, Control and Assurance. Introduction to ISO 9000, ISO 14000 and SA 8000 systems. 5s Practices.	

TRADE: GARMENT TECHNICIAN/SEWING MACHINE OPERATOR COURSE

DURATION – 3 MONTHS

WEEK NO.	THEORY	PRACTICAL
1.	<p>Overview of Textile Industry –Including Textile Fibres, Introduction to Textile Technology i.e. Yarn Manufacturing , Fabric Manufacturing (Woven & Knitted), Chemical Processing of Textiles, Cost calculation, Import & Export statistic, Strengths & Weakness of the industry.</p>	Familiarization to Textile Machines – Industrial Visit to Spinning, Weaving and Processing Units
2.	<p>Orientation to Quality Systems: Introduction to 4 point system, Introduction to 6 point system, Introduction to 10 point system, Introduction to AQL Standards, Introduction to 7-8 grantiville system.</p>	Collection of various fabric samples and methods of identification
3.	<p>Pattern making: Introduction to pattern making, tools used for pattern making</p>	Basic pattern making & practicing tools

- do -	Measurement taking, pattern making for Knits & Wovens in different styles	Pattern development for Knits & Wovens in different styles
- do -	Different styles for Kids, Men's & Women's	Pattern development in different styles for kids, men's & women's.
- do -	Pattern grading	Grading
- do -	Marker Planning: Introduction to marker planning, Computerized marker planning, Manual Marker planning	
4.	Spreading & Cutting: Spreading techniques, Manual Spreading, Machine	Operation of Spreading & Cutting Machine
- do -	Advantages of Machine & Manual Spreading, Disadvantages of Machine & Manual Spreading,	
- do -	Problem causes and remedies in Spreading	
- do -	Cutting: Types of cutting	
- do -	Types of cutting machines, straight knife cutting machine, band knife cutting machine	
- do -	Die cutter, laser cutting machine, problem causes and remedies in cutting	

- do -	Advantages & disadvantages of all cutting machines.	
- do -	Bundling & Numbering: Introduction to Bundling, introduction to numbering	
- do -	Advantages and disadvantages of Bundling and Numbering	
- do -	Loading: Loading Techniques, types of conveyor	
- do -	Introduction for different types of conveyor	

5.to 7	Sewing: Introduction about sewing machines	Sewing machine practice
- do -	Single needle lock stitch machine: Needle bar adjustment, presser foot adjustment,	
- do -	Feed dog movement , gear setting, stitch length adjustment, tension adjustment	Feed dog movement , gear setting, stitch length adjustment, tension adjustment
-do -	Computerized single needle lock stitch machine: Introduction, buttons and functions	Practicing buttons and functions
- do -	Over lock sewing machine: Introduction, types of machine. Three thread over lock: looper setting, needle bar adjustment	Speed controlling, threading Looper setting, needle bar adjustment
- do -	Feed dog setting, stitch length adjustment, time setting between looper and needle	Feed dog setting, stitch length adjustment, time setting between looper and needle
- do -	Four thread over lock: difference between three thread and four, looper setting, needle bar adjustment	Looper setting, needle bar adjustment, threading

- do -	Feed dog setting, stitch length adjustment, time setting between looper and needle	Feed dog setting, stitch length adjustment, time setting between looper and needle
-do-	Five thread over lock: difference between four thread & five thread, looper setting, needle bar adjustment	Looper setting, needle bar adjustment, threading
- do -	Feed dog setting, stitch length adjustment, time setting between looper and needle	Feed dog setting, stitch length adjustment, time setting between looper and needle

- do -	Six thread over lock: difference between five thread & six thread, looper setting, needle bar adjustment	Looper setting, needle bar adjustment, threading
- do -	Feed dog setting, stitch length adjustment, time setting between looper and needle	Feed dog setting, stitch length adjustment, time setting between looper and needle
- do -	Flat lock sewing machine: introduction, types of machines, Flat bed machine: looper setting, needle bar adjustment	Speed controlling, threading Looper setting, needle bar adjustment
- do -	Feed dog setting, stitch length adjustment, time setting between looper and needle	Feed dog setting, stitch length adjustment, time setting between looper and needle
-do-	Cylinder bed: looper setting, needle bar adjustment	Speed controlling, threading Looper setting, needle bar adjustment
- do -	Feed dog setting, stitch length adjustment, time setting between looper and needle	Feed dog setting, stitch length adjustment, time setting between looper and needle
- do -	Multi – head flat lock sewing machine: introduction, types of attachment, looper setting, needle bar adjustment	Speed controlling, threading Looper setting, needle bar adjustment

- do -	Feed dog setting, stitch length adjustment, time setting between looper and needle	Feed dog setting, stitch length adjustment, time setting between looper and needle
- do -	Button Hole Sewing machine: introduction, gear setting, stitch length adjustment	Gear setting, stitch length adjustment
- do -	Button fixing: introduction, Setting of machines for various sizes of buttons.	

- do -	Stitching: introduction, different types of stitches,	Stitches Developing.
- do -	Seams: introduction, different types of seams	Seams Developing
8.	Construction: introduction, stitching different styles in woven fabric	Stitching different styles in woven fabric
- do -	Stitching different styles in knitted fabric	Stitching different styles in knitted fabric
9.	Final checking: trimming & checking	
- do -	Needle detection: working with needle detection machine	
- do -	Embroidery Machine:	
10.	Finishing Machine:	Operation of Finishing Machine
- do -	Pressing: introduction, types of pressing, pressing techniques	
- do -	Packing: introduction, types of packing, Packing materials, Standards for packing materials.	
11-12	Two weeks practical Training in garments units:	

DEPARTMENT-SPINNING**ANNEXURE - 66****REGULAR COURSE CONTENT FOR SPINNING FITTERS**

BASIC TRAINING	DURATION IN WEEKS
FITTING	8WEEKS
TURNING	4WEEKS
CARPENTRY	2WEEKS
SHEET METAL WORK	3WEEKS
WELDING	2WEEKS
ELECTRICAL	4WEEKS
ELECTRONICS	3WEEKS

TEXTILE TRAINING	DURATION
orientation to textile	2WEEKS
sector	2WEEKS
ginning	11WEEKS
blowroom	11WEEKS
carding	8WEEKS
comber	6WEEKS
drawframe	6WEEKS
simplex	6WEEKS
ring frame	12WEEKS
winding	2WEEKS
rotor spinning	2WEEKS
compact spinning	2WEEKS
air jet spinning	2WEEKS
dref spinning	2WEEKS
T.F.O	2WEEKS
ring doubler	1WEEK
quality assurance	1WEEK

DEPARTMENT-WEAVING**ANNEXURE - 67****REGULAR COURSE CONTENT FOR WEAVING FITTERS**

BASIC TRAINING	DURATION IN WEEKS
FITTING	8WEEKS
TURNING	4WEEKS
CARPENTRY	2WEEKS
SHEET METAL WORK	3WEEKS
WELDING	2WEEKS
ELECTRICAL	4WEEKS
ELECTRONICS	3WEEKS

TEXTILE TRAINING	DURATION IN WEEKS
Orientation of textile sector	2 Weeks
Orientation of yarn manufacture	2 Weeks
Technical terms in yarn trade	1 Week
Weaving Preparatory process	1 Week
Warping parts	3 Weeks
Pirn winding	3 Weeks
Sizing	4 Weeks
Sizing Ingredients	2 Weeks
Reed Count	2 Weeks
Loom Gaiting technic	3 Weeks
Design of Basic weave	2 Weeks
Modified Weave	2 Weeks
Yarn defects & remedy	1 Week
Fabric Formation	2 Weeks
Plain Loom Details	5 Weeks
Loom timing diagram	1 Week
Loom drive	2 Weeks
Dobby system	3 Weeks
Drop Box loom	3 Weeks
Jacquard	3 Weeks
Projectile looms	5 Weeks
Rapier Looms	5 Weeks
Airjet Looms	4 Weeks
Water Jet Looms	3 Weeks
Quality Assurance & Control	2 Weeks

DEPARTMENT-KNITTING**ANNEXURE - 68****REGULAR COURSE CONTENT FOR KNITTING FITTERS**

BASIC TRAINING	DURATION IN WEEKS
FITTING	8WEEKS
TURNING	4WEEKS
CARPENTRY	2WEEKS
SHEET METAL WORK	3WEEKS
WELDING	2WEEKS
ELECTRICAL	4WEEKS
ELECTRONICS	3WEEKS

TEXTILE TRAINING	DURATION IN WEEKS
Orientation of Knitting sector	1 Week
Orientation of Yarn	1 Week
Hand Knitting Machine	2 Week
Weft Knitting machine	1 Week
Single Jersey machine	1 Week
Mechanical & Electrical details	5 Weeks
Identification of course & Wales	1 Week
Production Calculation & Cost Calculation	1 Week
Trouble Shooting	2 Weeks
Various kinds of single jersey machine	2 Weeks
Rib machine	2 Weeks
Mechanical & Electrical details of rib m/c	5 Weeks
Course & Wales in Rib fabric	1 Week
Cylinder & Dial Cam function	1 Week
Rib Jacquard M/c	2 Weeks
Mechanism of Jacquard	2 Weeks
Mechanism of Pattern Drum	2 Weeks
Trouble Shooting problems in rib m/c's	2 Weeks
Lubricating Technology	2 Weeks
Various kinds of rib m/c's	2 Weeks
Interlock M/c's	2 Weeks
Mechanical & Electrical parts of interlock m/c's	6 Weeks
Identification of course & Wales in I/L fabric	2 Weeks
Trouble Shooting in I/L M/c	2 Weeks

Knitting Cycle	2 Weeks
Warp Knitting M/c	2 Weeks
Tricot M/c	4 Weeks
Raschel M/c	3 Weeks
Socks Knitting M/c	1 Week
Warp & Weft Knitting	1 Week
Comparison	
Quality Assurance	1 Week

DEPARTMENT-GARMENT**REGULAR COURSE CONTENT FOR GARMENT FITTERS**

BASIC TRAINING	DURATION IN WEEKS
FITTING	8WEEKS
TURNING	4WEEKS
CARPENTRY	2WEEKS
SHEET METAL	
WORK	3WEEKS
WELDING	2WEEKS
ELECTRICAL	4WEEKS
ELECTRONICS	3WEEKS

<u>TEXTILE TRAINING</u>	DURATION
Orientation of textile sector	1 Week
Orientation of quality system	1 Week
Pattern making	4 Weeks
Pattern grading	1 Week
Marker planning	2 Weeks
Spreading	4 Weeks
Cutting	7 Weeks
Bundling & Numbering	3 Weeks
Loading	2 Weeks
Sewing	2 Weeks
Singer M/c's	2 Weeks
Feed Dog Movement	2 Weeks
Computerised Singer M/c	2 Weeks
Overlock M/c	8 Weeks
Five Thread overlock m/c	4 Weeks
Six Thread overlock m/c	4 Weeks
Flat Lock Sewing m/c	4 Weeks
Cylinder Bed	4 Weeks
Multi Head Flat Lock	4 Weeks
Button Hole Sewing M/c	1 Week
Button Fixing	1 Week
Stitching	2 Weeks
Seam	2 Weeks
Stitching Construction	4 Weeks
Final Checking	1 Week
Needle detection	1 Week
Pressing	1 Week
Packing	1 Week

REGULAR COURSE CONTENT FOR PROCESSING FITTERS

BASIC TRAINING	DURATION IN WEEKS
FITTING	8WEEKS
TURNING	4WEEKS
CARPENTRY	2WEEKS
SHEET METAL	
WORK	3WEEKS
WELDING	2WEEKS
ELECTRICAL	4WEEKS
ELECTRONICS	3WEEKS
TEXTILE TRAINING	DURATION
Orientation of textile sector	1 Week
Drives	2 Weeks
Bearings	1 Week
Pneumatics	2 Weeks
Motors	1 Week
Orientation of fabrics	1 Week
Process sequence	1 Week
Maintenance schedule	2 Weeks
Desizing process	2 Weeks
Maintenance of desizing	3 Weeks
Trouble shooting in desizing	1 Week
Scouring process	1 Week
Maintenance of opened and closed jigger	2 Weeks
Maintenance of safety devices and switches	2 Weeks
Trouble shooting in scouring M/c	1 Week
Bleaching	1 Week
Maintenance of Bleaching M/c	1 Week
Purpose of maintenance of temp & Control Panel	1 Week
Trouble Shooting in bleaching	1 Week
Mercerising purpose & Chemicals	1 Week
Maintenance of mercersiring	2 Weeks
Expander types & functions	1 Week
Maintenance of safety devices	1 Week
Trouble Shooting in mercersing m/c's	1 Week
Dyeing Purpose	2 Weeks
Application of various dyes	3 Weeks
Salient features of various dyeing m/c's	4 Weeks
Maintenance of various dyeing m/c's	3 Weeks
Display employed in various dyeing m/c's	2 Weeks
Trouble shooting & Dyeing M/c's	1 Week
Drying M/c's	1 Week
Maintenance of drying M/c's	2 Weeks
Display employed in various driers	1 Week
Trouble Shooting in Dryer M/c	1 Week
Printing	2 Weeks
Printing mechanism	2 Weeks
Maintenance of various printing,	4 Weeks
Finishing	2 Weeks
Maintenance of various finishing m/c's	2 Weeks
Quality assurance	1 Week

DEPARTMENT-
MECHATRONICS

ANNEXURE - 71

REGULAR COURSE CONTENT FOR MECHATRONICS FITTERS

BASIC TRAINING	DURATION
Electrical	18 Weeks
Electronics	4 Weeks
Mechatronics	4 Weeks

TEXTILE TRAINING

BASIC TRAINING	DURATION
Introduction	3 Weeks
Blow Room,Carding	3 Weeks
Lap Formers & Combers	2 Weeks
Drawframe	2 Weeks
Speed Frame	2 Weeks
Ring Frame	1 Week
Auto Cone Winding	4 Weeks
Application Of mechatronics in	
Blow Room,Carding	6 Weeks
Comber & Drawframe	8 Weeks
Lap Formers & Speed Frame	5 Weeks
Spinnig,Winding,Knitting &	16 Weeks
Weaving	16 Weeks

Testing Application	
Pneumatic automations in Textile Machinery	8 Weeks
Advanced Automation system	22 Weeks

Training for ITI (Woollen Textiles & Clothing)

First Semester

Introduction of Wool & Woollen Textiles in India

- Introduction of the latest technology on of Wool fibre improvement (Development of speciality Fibres – development like Pashmina, Angora)
- ❖ Introduction of all type of wool fibres in India
- ❖ Breed improvement
- ❖ Health & veterinary care of sheep
- ❖ Proper shearing of wool
- ❖ Primary washing & grading of wool
- ❖ Short visit to shearing, washing & grading of wool centres

Second Semester

Spinning & Weaving in Wool & woollen Textiles

Introduction on all the sectors ,Process involved in latest technology development in all the organised & Decentralised Sectors

➤ **Organised Sector**

- ✓ Composite Units (Starting from raw wool to the final manufacturing of woollen fabric)
- ✓ Worsted & Non-worsted Spinning Units
- ✓ Machine Made Carpet Manufacturing Units

➤ **Decentralised Units**

- ✓ **Hosiery & Knitting**
- ✓ Powerlooms
- ✓ Hand Knotted Carpets, Druggets, Nanadahs
- ✓ Independent Dyeing & Processing Houses.

Third Semester

Quality Processing of Wool & woollen Products

- ❖ Carpet finishing process
- ❖ Shawl finishing process
- ❖ Garment Manufacturing & Quality Assurance
- ❖ Latest development in carpet & shawl manufacturing Technology
- ❖ Human Resource Development
- ❖ Dyeing & Finishing of wool fibre & woollen fabrics
- ❖ Color sensibility enhancement & visual presentation
- ❖ Production Planning & Control
- ❖ Design & Product Development(Including fibre, fabric ,style ,Colour ,trend forecasting of all the wool & woollen textiles products)

Fourth Semester

Marketing & Merchandising Management

- ◆ **Business Development for domestic & exports markets**
- ◆ **Supply chain Integration for raw material**
- ◆ **Increasing Market penetration**
- ◆ **Marketing**
- ◆ **Branding of all wool & woollen products**
- ◆ **Entrepreneur Development**
- ◆ **One month practical project work on any chosen wool and woollen Textiles Industry.**

