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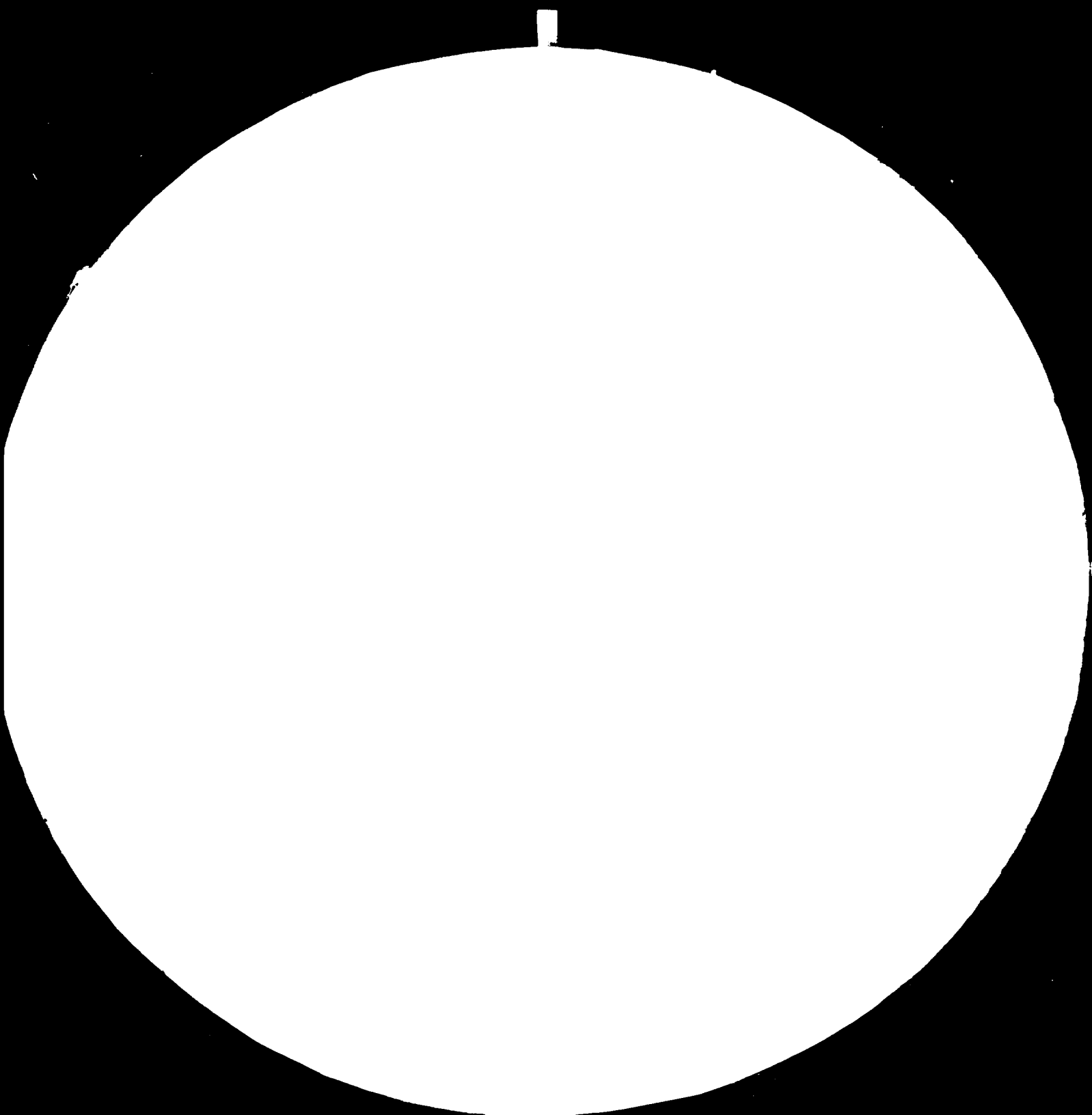


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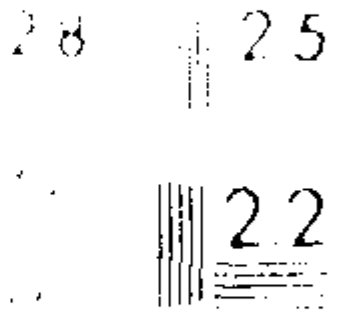
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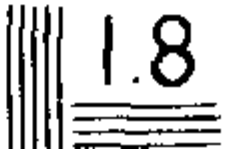
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24 May 1983
English

TEXTILE INDUSTRY DEVELOPMENT PROGRAMME

DP/BGD/82/006

BANGLADESH

Terminal report*

Prepared for the Government of Bangladesh
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Walid M. Walid,
Expert in Textile Bleaching, Dyeing, Printing and Finishing (Training)

United Nations Industrial Development Organization
Vienna

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C O N T E N T S

Final Report - Dyeing & Finishing Adviser(Training)

Part - I

Introduction

This report deals with the activities of the training adviser for dyeing and finishing Mr. Walid M. Walid. It covers his assignment to Textile Industry Development Programme (Project No. BGD/82/006 & BGD/73/049) of the Bangladesh Textile Mills Corporation (BMTC). The adviser joined the project on 14th August 1979 and left the duty station in Dhaka on March 18th, 1983.

Part - II

Purpose of Project

Development of the textile industry in Bangladesh.

Part - II A - Development Objectives:*

The development objective to which this project is related is to increase the domestic production of cotton textiles in Bangladesh and to reduce the reliance upon imports of cotton cloth by increasing the production, improving the quality and reducing the production costs of cotton yarn.

Part - II B - Immediate Objectives:

i) To up-grade the levels of skill of selected BTMC managerial and supervisory staff and of skilled workers in selected number of mills.

ii) To establish central training and advisory services for BTMC Mills.

iii) To improve the quality of yarn and cloth produced by BTMC Mills through the establishment of quality control and process control measures at all stages.

iv) To improve machine productivity of BTMC Mills through establishment of suitable preventive maintenance systems and repair services.

* Source : Project Document

Part - III

Summary

A total of 1131 persons completed training in dyeing and finishing. Ninety eight (98) courses were conducted. The output was 15,350 man-days. The average attendance was 91.6%. Attendance at management courses 77.6%, attendance at skilled personnel courses 99.9%.

I - Personnel Training

a) Management

A total of 35 out of 109 persons on the average completed training in all aspect of Dyeing and Finishing. Several Dyestuff Company's representatives and private mills technicians also attended the training courses.

b) Skilled Personnel

A total of 1038 skilled workers (Jobbers and Machine Operators) completed training in bleaching, dyeing, printing and finishing.

II - Training Courses

a) Management

Four comprehensive training courses were written in Bleaching, Dyeing, Printing and Finishing. Implementation of the training in all aspects averaged 10.92 weeks per each group of trainees. Counterparts fully trained in all subjects. Duration of training courses as follows:

No.	Title of Course	Duration
1.	Bleaching	3.12 weeks
2.	Dyeing	7.00 weeks
3.	Printing	6.40 weeks
4.	Finishing	2.00 weeks
	TOTAL :	18.52 weeks

b) Skilled Workers Training Courses

Four courses were prepared for training Jobbers and Machine Operators of a duration of one week per each course. The courses were as follows:

1 - Preparation of cotton for dyeing and printing
2 - Dyeing technology
3 - Printing technology
4 - Finishing of cotton fabrics

III - Output (Man-days)

The total output was 15,350 Man-days for managerial staff and skilled personnel.

Level	Man-day
Management	9263
Jobbers	6087
Total :-	15350

IV - Training Abroad

Eleven senior and middle level personnel have been sent for overseas training in Dyeing, Finishing and Quality Control to Netherlands and Egypt.

Part - IV

Findings and Recommendations

1. The per capita consumption of cloth in Bangladesh is one of the lowest in the world, at about six yard per persons, which is considered below the minimum cloth requirements in a developing country. At the present level of cloth production Bangladesh falls far short from its need by roughly 550 million yard per year. By the year of 1990 the short-fall may reach 834 million yard at the present production level.

2. Most of the cotton fabric is produced from imported raw cotton. The availability of raw cotton presents a serious problem to the textile industry, price fluctuation in world market reflects directly on the loss-profitability margin of the BTMC which generally has a very little control on the prices of the finished products, leading to considerable losses in the majority of the textile mills.

3. The hand loom weaving sector is the major fabric producer in Bangladesh. It provides roughly 60% of the total fabric production in Bangladesh. The BTMC weaving sector provides less than 40% of the total fabric production. Productivity increase, quality improvement and introduction of cotton blends are positive steps to attain the goal of 12 yards per person.

4. Financial constraints and restrictions on the ability of the Corporation to buy raw cotton creates an acute shortage of raw cotton and causes reduction of output in the textile mills.

5. Cash flow continues to be a serious problem in considerable number of textile mills. Even when cash is made available proper production planning is needed to avoid tieng up this money at one stage of production or another. Co-ordination between marketing and production is advisable to avoid tieing the cash in unfinished products.

6. Idle capacity in finishing mills varies from 20 to 30 per cent. Lack of spare parts and out-dated machinaries are the main reasons.

7. Lack of adequate maintenance compiled with acute shortage in maintenance force and poor facilities for production of spare parts and components for textile mill machinery is another constraint on the efficiency in the textile industry.

8. A further constraint on efficient production in the textile industry has been the frequency of power failure. In some areas production loss of 25% is daily practice.

9. There is an acute shortage of highly trained personnel at all levels of the industry. About 37% of the managerial staff are University or College products. A considerable number of the managerial staff has insufficient training for posts they currently filling. They moved into senior position by vitue of their experience after the 1971 War of Independence and departure of most West Pakistanis who occupied the majority of the senior positions in the industry.

10. There is a considerable surplus of unskilled workers and machine operators. The vast majority of them come from an agricultural background and still have their ties with their village communities. At harvest seasons these workers return back to their villages for long periods causing disruption of production, serious machines shutdowns and low output in millls.

11. Loyality to district and village community among management and workers is higher than loyality to the mills. This phenomenon is found to have a negative effect on the productivity of the textile mills.

Recommendations

1. There is an urgent need for Bangladesh to grow cotton locally. Imported cotton is expensive, freight, handling charges, insurance, import duties, excise duties and sale's taxes etc. impose a financial burden to already financially troubled textile mills.

2. The purchase policy of BTMC may have to be carefully re-evaluated. When buying raw materials, chemicals, dyestuffs etc. lowest bid is generally accepted, in many cases low priced products are of inferior quality or lower strength. Analysis of quality, money value, ease of application, sensitivity to mill conditions have to be considered. Highly priced products generally produce high quality fabrics and reduces machine's down time.

3. The BTMC may need to consider advertising campaign specially for good quality fabric. The campaign is needed to promote sales and improve the standing of the locally made fabric against imports.

4. Regular market analysis study may prove helpful in producing appropriate designs and product promotion.

5. Increase of sale outlets specially in the heavily populated district is advisable. Wide varities of fabrics should be made available at these outlets with competitive prices.

6. Price deregulation of textile fabrics should not be ruled out specially for products which are sold below cost of manufacturing. Government subsidies for popular fabrics may be an alternative if BTMC has to turn profit.

7. Production trials of Polyester/Cotton blended fabric has started, it is advisable to include the urgently needed machine required for finishing these blends in the plan for balancing, modernisation and rehabilitation.

8. Shut down of finishing mills due to shortage of raw materials, chemicals and dyestuffs can be minimised by advance proper planning. A yearly production plan has to be drafted by the BTMC and passed to all mills to estimate their needs. Orders for purchase are to be made well in advance.

9. Process and Quality Control measures in the mills has to be established and enforced by BTMC. Daily datas are to be submitted once every month to the Corporation for monitoring and necessary actions.

10. The art and design department in the BTMC hardly exists. One designer with no equipments does not meet the needs of BTMC in this field. Unless attention is given to this area the quality of printed fabrics will remain poor.

11. Soft water treatment is highly recommended for boiler's feed water in order to cut expensive fuel cost and prevent scale formation as well as corrosion in boilers. A pH control (pH 9 to 11) must be monitored to avoid pin-holes in the tubes. Water of hardness less than 5 parts per million (P.P.M) must be used. Water used for steam production in mills around Dhaka has hardness of 150 p.p.m. and 400 p.p.m. around Khulna and Barisal areas.

12. Fabrics bleached with bleaching powders in all BTMC mills shows a big loss in tensile strength and relatively high amount of chemical damage (Oxycellulose). The life time of this fabric is far less than average. In addition to inadequate level of education and experience among worker it is highly recommended to replace bleaching powders by Sodium hypochlorite. Solution of the later themselves to controlled bleaching.

13. Ageing roller printing machines in the mills has to be gradually replaced by rotary screen printing machines for economic reasons and efficient production. Engraving of Copper rollers is expensive and out of date.

14. Electroplating units are recommended for Olympia Textile Mills and Ahmed Bawany Textile Mills. Chromium Electroplating of Copper rollers increases its life by several hundred thousands of yards and makes Copper rollers less sensitive to damages.

15. Agers used for development of printed goods are in bad running condition. Proper maintenance programme has to be enforced by BTMC.

16. All Stenter frames in the dyeing and finishing mills are low temperature clip frames. These frames are not suitable for finishing Synthetic and blended fabrics(Polyester/Cotton blends). High temperature pin frames are recommended for BMR plans.

17. Crease resist, water repellent finishes has to be tried by BTMC Mills (Pin-frames to be used for these finishes).

18. Drainage of qualified technicians and skilled personnel to overseas employment create acute shortage of highly qualified personnel needed for the industrial development in Bangladesh. Proper incentives and strict regulation is advisable for industrial development of the country.

19. Foreign and local assistance to Dhaka College of Textile Technology is urgently needed for the textile development in Bangladesh.

20. The Training Centre in Savar is required to fill the gap resulting from abolishing the Diploma Degree in the Textile College to avoid future shortages in middle management personnel.

Part - V

Training Programme

1. Introduction

The project is to provide in-service training and skill up grading of about 450 skilled personnel and trained managerial staff by the end of the project, about one third of whom will be management and accounting staff. Based on the above objectives provided by the Project Document and assuming equal number to be trained in the three fields of Spinning, Weaving and Dyeing. The objective for dyeing and finishing is to train

50 managerial personnel

100 skilled personnel

At the start of the project the managerial staff employed by the BTMC was roughly 130 personnel. Due to several factors such as resignations, overseas employment and disinvestment, the number of technicians in the BTMC mill was declining steadily through the life of the project. At present only 54 technicians are employed by BTMC.

2. Content and Structure of the Training Programme

The experience gained from meeting technicians and skilled personnels at different levels in nineteen of the twenty four mills under the BTMC at the start of the project taught us the following facts:

1. The theoretical knowledge of the technical staff is generally adequate, however, at lower levels(Shift-in-Charge and Supervisors) assistance is needed.

2. At all levels of management there are considerable numbers of personnel with difficulties in understanding chemical calculations and mathematics.

3. The practical knowledge however was mediocre although they all had mill experience for several years.

Based upon the above mentioned findings a comprehensive training programme was established covering the subjects that are actually needed for retraining those who had received educational and training programmes in the Textile College.

The Courses are :-

A. Classification of textile fibres, bleaching & mercerisation

B. The technology of dyeing (Phase I & II)

C. The technology of Printing(Phase I & II)

D. Finishing of textile fabrics(See Appendix 10)

For those with educational background lower than Diploma level (Diploma = 3 Years study in the Textile College) reference is made in the theoretical classes in mathematics, Physics and Chemistry subject where references were required.

3. Methods of Selection

The BTMC selected sixteen mills for the project activities. The expert proposed training all the staff in the twenty four mills with finishing facility under the BTMC and the proposal was accepted. Selection of trainees was based on the academic background as well as job level and the language understanding.

4. Methods Used

A. Management

Training was conducted as follows:-

a. Theoretical lectures

b. Industrial implementation in four selected mills

The industrial implementation substituted the experimental training since the equipment requested for the Training Centre was not made available.

B. Jobber and Machine Operators

Training was conducted in Bengali language as follows:-

1. Basic idea of the processing
2. Operational instructions
3. Efficiency and productivity
4. Effect use of raw materials and chemicals
5. Preventive maintenance
6. Health and safety measures.

5. Out-put

a. Personnel

A total of 1131 persons of the managerial staff and the skilled personnel completed training in Bleaching, Dyeing, Printing and Finishing (See Appendix 1)

Management Personnel

A total of 85 out of 109 persons on the average completed training in Bleaching, Dyeing, Printing and Finishing. Several personnel from the private textile mills and Dyestuff Companies representative also joined the training.

(Appendix 2, 3, 4 and 5)

Skilled Personnel

A total of 1038 skilled personnel (Jobbers and Machine Operators) completed training in Bleaching, Dyeing, Printing and Finishing(See appendix 6, 7, 8 and 9).

5. Courses Conducted

Thirty one courses for managerial staff are conducted with average of three weeks duration per course. Sixty seven courses for skilled personnel are completed with one week duration.

Level	Number of Courses	Duration
Management	31	3.81 weeks
Jobbers	67	1 Week
TOTAL :	98	

Man-days

A total of 15,390 man-days training had been carried out

Level	Man-days
Management	9263
Jobbers	6087
TOTAL :	15350 Man-days

6. Training Abroad

Eleven senior and middle level personnel received an overseas on-the-job training in Dyeing and Finishing in the Royal Textile Mills, Nijverdal, Ten Cate, NOV. in Almelo, The Netherlands for six months. One person received overseas training in Quality Control at Cotton Consolidated Fund in Alexandria, Egypt for six months.

7. Counterpart Training

Counterpart received full training in all technical and organisational aspect of the project at present they are capable of conducting all courses.

Name	Title	Joined	Man-months	Remarks
1. MR. A.K.M.S. Huda	Sr. Counterpart	3.10.79	44 man-months	
2. MR. Abu Tahir	Jr. Counterpart	1.12.79	36 man-months	Resigned on 30th Nov. 1982
3. MR. A.K. Roy	Jr. Counterpart	1.2.82	13 man-months	

Part - VI

A C K N O W L E D G E M E N T S

I acknowledge the help and cooperation to the following during the period of my assignment in Bangladesh:

To : The Resident Representative, UNDP, Dhaka and his staff for the help on many administrative matters.

To : Mr. Nurun Nabi Chowdhury, Chairman of BTMC for the support and cooperation.

To : Mr. A. S. M. Shahid, Director(Planning & Development), of BTMC for his support and cooperation.

To : Mr. Abul Hussain, Director(Operations), of BTMC for his enthusiasm and continued support and cooperation.

To : Mr. Berk Zecer, SIDFA/UNIDO, for his support and cooperation.

To : Mr. Abul Kashem, Principal, Dhaka College of Textile Technology, for his cooperation in making the classes facilities available for training.

To : The Dyestuff Suppliers: Sandoz, Ciba, Indian Dyestuff Industries, B.A.S.F, Bayer, Hoechest for making their technical manuals available for training.

To : The Chief Executives of BTMC Mills who extended a cordial reception and co-operated in releasing trainees.

To : My colleagues in the project for their cooperation in matters of mutual interest.

To : The people and the Government of the People's Republic of Bangladesh for their hospitality and friendliness.

APPENDIX - 1

TRAINING OUTPUT - DYEING & FINISHING

Output (Man-days) : 15,350 Man-days Persons Attended : 1516 Persons

Courses conducted : 98 Courses Attendance % : 69.6%

No.	Title of the Course	No. of Courses	Level	Average Duration	No. Available	No. Attended	Attend-ance %	Output Man-days
1.	Bleaching & Mercerisation	8	Management	18.7 days	130	121	93	
2.	Dyeing Technology(Phase I)	6	"	21.2 "	130	104	80	
3.	Dyeing Technology(Phase II)	5	"	20.8	108	74	69	
4.	Printing Technology(Phase I)	5	"	19.5	108	85	79	
5.	Printing Technology(Phase II)	5	"	18.9	108	74	69	
6.	Finishing Technology	2	"	10 "	54	20	37	
	Sub-total :	31		109.1 "	638	478	74.9	
7.	Preparation of Cotton for Dyeing	31	Jobbers & Machine Operators	6 days	*	457		
8.	Dyeing	23	"	6 "	*	377		
9.	Printing	6	"	6 "	*	97		
10.	Finishing	7	"	5 "	*	107		
	Sub-total :	67		-	1541 Weighted av.	1038	67.4	
	TOTAL :	98		-	2179	1516	69.6	

* No. Available - Upto end Dec. 1981 = 1675
" " Nov. 1982 = 1396
" " Mar. 1983 = 698

Appendix - 2

Training Output

Subject :- Classification of Textile Fibres,
Bleaching and Mercerization

Level :- Management

No.	No. of Days	DURATION FROM	DURATION TO	Persons Called	Persons Attended	Man-days	Level
1.	12	19.11.79	1.12.79	13	12	144	Assistant Manager & Dye Masters
2.	18	31.12.79	19.01.80	10	10	180	Assistant Dye Masters
3.	21	4.02.80	27.02 80	17	14	294	Shift-in-Charge(S.I.C)
4.	18	24.03.80	12.04.80	18	16	288	Shift-in-Charge(S.I.C)
5.	18	5.05.80	24.05.80	14	11	198	Shift-in-Charge & Supervisors
6.	18	9.06.80	28.06.80	14	13	234	Supervisors
7.	23	14.07.80	6.08.80	28	24	552	Supervisors
8.	18	1.09.80	20.09.80	23	21	378	Supervisors

Number of courses conducted	:	8 Courses
Total trainees called	:	137 Trainees
Total trainees attended	:	121 Tr -
Attendance percentage	:	88% ately
Man-days	:	2268 Man-days

Appendix - 3

Training Output

Subject :- Technology of Dyeing

Level :- Management

No.	No. of Days	DURATION FROM	DURATION TO	Attendance Called	Attendance Attended	Man-days	Level
1.	22	26.01.81	19.02.81	20	14	308	Assistant Dye Master & S.I.C.
2.	24	2.03.81	28.03.81	27	21	504	Shift-in-Charge(S.I.C)
3.	18	6.04.81	25.04.81	13	12	216	Managers and Dye Masters
4.	21	11.05.81	3.06.81	24	21	441	Shift-in-Charge & Supervisers
5.	24	15.06.81	11.07.81	20	14	336	Supervisers
6.	18	10.08.81	29.08.81	32	22	396	Supervisers
7.	21	19.10.81	11.11.81	22	15	315	Assistant Dye Masters(A.D.M)
8.	21	16.11.81	9.12.81	29	14	294	Managers, Dye Masters and ADM.
9.	23	21.12.81	15.01.82	36	24	552	Shift-in-Charge(S.I.C)
10.	18	8.03.82	27.03.82	26	13	234	Supervisors
11.	18	7.06.82	26.06.82	18	8	144	Supervisers

Number of courses conducted : 11 Courses

Total trainees called : 267 Trainees

Total trainees attended : 178 Trainees

Attendance percentage : 67% Approximately

Man-days : 3740 Man-days

Appendix - 4

Training Output

Subject :- The Technology of Printing

Level :- Management

No.	No.of Days	DURATION FROM	DURATION TO	Attendance Called	Attendance Attended	Man-days	Level
1.	18	18.01.82	6.02.82	20	19	342	Assistant Dye Masters
2.	18	15.02.82	6.03.82	20	16	288	Dyeing Managers & Dye Master
3.	20	29.03.82	17.04.82	20	15	300	Shift-in-Charge
4.	23	3.05.82	28.05.82	24	20	460	Shift-in-Charge & Supervisor
5.	18	28.06.82	17.07.82	10	15	270	Supervisors
6.	21	30.08.82	22.09.82	26	24	504	Assistant Dye Masters
7.	19	10.10.82	3.11.82	15	14	266	Dyeing Manager & Dye Master
8.	20	7.11.82	2.12.82	26	17	340	Shift-in-Charge
9.	15	12.12.82	30.12.82	25	11	165	Supervisors
10.	15	2.01.83	20.01.83	11	8	120	Supervisors

Number of courses conducted	:	10	Courses
Total trainees called	:	197	Trainees
Total trainees attended	:	159	Trainees
Attendance percentage	:	81%	Approximately
Man-days	:	3055	Man-days

Appendix - 5

Training Output

Subject :- Finishing Technology

Level :- Management

No.	No. of Days	DURATION FROM	DURATION TO	Attendance Called	Attendance Attended	Man-days	Level
1.	10	23.01.83	3.02.83	12	10	100	Assistant Dyeing Masters
2.	10	13.03.83	24.03.83	13	10	100	Shift-in-Charge and Supervisors

Number of courses conducted : 2 Courses

Total number of trainees called : 25 Trainees

Total number of trainees attended : 20 Trainees

Attendance percentage : 80%

Man-days : 200

P.S : The Course for Assistant Managers and Dyeing Masters has been postponed for urgent need of the trainees to remain in their mills to process School Dress fabrics to the Primary and Mass Education Directorate as per contract.

Appendix - 6

Training Output

Subject : Preparation of Cotton for dyeing (Bleaching & Mercerization)

Level : Jobbers and Machine Operators

No.	No. of Days	DURATION FROM	DURATION TO	Attendance Called	Attendance Attended	Man-days	Name of Mills
1.	6	22.09.80	27.09.80	24	24	144	Olympia Textile Mills
2.	6	29.09.80	4.10.80	22	22	132	Olympia Textile Mills
3.	6	2.10.80	8.10.80	19	10	60	Ahmed Bawany Textile Mills
4.	6	6.10.80	11.10.80	21	21	126	Olympia Textile Mills
5.	6	9.10.80	15.10.80	14	14	84	Ahmed Bawany Textile Mills
6.	6	30.10.80	5.11.80	14	14	84	Pahartali Textile Mills
7.	6	10.11.80	15.11.80	23	20	120	Chittaranjan Cotton Mills
8.	6	10.11.80	15.11.80	19	14	84	Luxminarayan Cotton Mills
9.	6	17.11.80	22.11.80	14	14	84	Dhakeswari Cotton Mills No. II
10.	6	17.11.80	22.11.80	17	15	90	Dhakeswari Cotton Mills No. I
11.	6	24.11.80	29.11.80	17	17	102	Dhakeswari Cotton Mills No. II
12.	6	24.11.80	29.11.80	13	12	72	Dhakeswari Cotton Mills No. I
13.	6	8.12.80	13.12.80	18	21	126	Chittaranjan Cotton Mills Ltd.
14.	6	8.12.80	13.12.80	19	18	108	Luxminarayan Cotton Mills
15.	6	15.12.80	20.12.80	8	8	48	Gawsia Cotton Spg. Mills
16.	6	22.12.80	27.12.80	36	33	198	Muslin Cotton Mills
17.	6	22.12.80	27.12.80	14	14	84	Sharmin Textile Mills
18.	6	29.12.80	3.01.80	13	15	90	Jalil Textile Mills Ltd.
19.	6	8.01.81	10.01.81	9	9	54	Chittagong Textile Mills
20.	6	12.01.81	17.01.81	10	10	60	Sharmin Textile Mills
21.	6	23.02.81	28.02.81	7	7	42	Al-Haj Textile Mills
22.	6	9.03.81	14.03.81	8	15	90	Mohini Cotton Mills
23.	6	16.03.81	21.03.81	13	11	66	Jalil Textile Mills
24.	6	27.03.81	2.04.81	5	5	30	Al-Haj Textile Mills
25.	6	4.05.81	9.05.81	10	9	54	Chittagong Textile Mills
26.	6	4.05.81	9.05.81	5	4	24	Asiatic Cotton Mills
27.	6	16.05.81	21.05.81	17	17	102	Muslin Cotton Mills
28.	6	25.05.81	30.05.81	9	9	54	Halima Textile Mills
29.	6	30.05.81	4.06.81	17	17	102	Muslin Cotton Mills
30.	6	22.06.81	27.06.81	12	12	72	Halima Textile Mills
31.	6	19.04.82	24.04.82	26	26	156	Ibrahim Cotton Mills

Number of courses conducted	: 31	Courses
Total trainees called	: 473	Trainees
Total trainees attended	: 457	Trainees
Attendance percentage	: 97%	Approximately
Man-days	: 2742	Man-days

Appendix - 7

Training Output

Subject :- Dyeing

Level :- Jobbers and Machine Operators

No.	No. of Days	DURATION FROM	DURATION TO	Attendance Called	Attendance Attended	Man-days	Name of Mills
1.	6	19.10.81	24.10.81	19	19	114	Luxminarayan Cotton Mills
2.	6	26.10.81	31.10.81	13	18	108	Jalil Textile Mills
3.	6	2.11.81	7.11.81	22	21	126	Chittaranjan Cotton Mills
4.	6	9.11.81	14.11.81	14	16	96	Sharmin Textile Mills
5.	6	16.11.81	21.11.81	20	19	114	Luxminarayan Cotton Mills
6.	6	23.11.81	28.11.81	32	32	192	Chittaranjan Cotton Mills
7.	6	30.11.81	5.12.81	6	8	48	Olympia Textile Mills
8.	6	14.12.81	19.12.81	11	10	60	Olympia Textile Mills
9.	6	21.12.81	26.12.81	20	20	120	Chittagong Textile Mills
10.	6	11.01.82	16.01.82	9	10	60	Gawsia Cotton Spinning Mills
11.	6	8.03.82	13.03.82	10	7	42	Ahmed Bawany Textile Mills
12.	6	15.03.82	20.03.82	10	10	60	Sharmin Textile Mills
13.	6	22.03.82	27.03.82	15	23	138	Halima Textile Mills
14.	6	19.04.82	24.04.82	18	15	90	Pahartali Textile Mills
15.	6	19.04.82	24.04.82	15	26	156	Ibrahim Cotton Mills
16.	6	26.04.82	01.05.82	44	44	264	Muslin Cotton Mills
17.	6	26.04.82	01.05.82	11	9	54	Ahmed Bawany Textile Mills
18.	6	17.05.82	22.05.82	11	11	66	Al-haj Textile Mills
19.	6	24.05.82	29.05.82	13	12	72	Jalil Textile Mills
20.	6	24.05.82	29.05.82	6	5	30	Dhaka Cotton Mills
21.	6	14.06.82	19.06.82	16	10	60	Al-haj Textile Mills
22.	6	2.08.82	7.08.82	19	21	126	Karilin Silk Mills
23.	6	20.09.82	25.09.82	11	11	66	Karilin Silk Mills

Number of courses conducted : 23 Courses

Total number of trainees called : 365 Trainees

Total number of trainees attended : 377 Trainees

Attendance percentage : 103% Approximately

Man-days : 2262 Man-days

Appendix - 8

Training Output

Subject :- Printing

Level :- Jobbers and Machine Operaters

No.	No. of Days	DURATION FROM	DURATION TO	Attendance Called	Attended	Man-days	Name of Mills
1.	6	16.08.82	21.08.82	11	11	66	Ahmed Bawany Textile Mills
2.	6	14.08.82	19.08.82	25	25	150	Muslin Cotton Mills
3.	6	23.08.82	28.08.82	8	14	84	Al-daj Textile Mills
4.	6	23.08.82	28.08.82	10	14	84	Olympia Textile Mills
5.	5	3.10.82	7.10.82	14	12	60	Ahmed Bawany Textile Mills
6.	5	14.11.82	18.11.82	21	21	105	Karilia Silk Mills

Number of courses conducted	:	6	Courses
Total number of trainnes called	:	89	Trainees
Total number of trainees attended:		97	Trainnes
Attendance percentage	:	109%	
Man-days	:	549	Man-days

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Training Output

Subject :- Finishing

Level :- Jobbers and Machine Operaters

No.	No. of Days	DURATION FROM	DURATION TO	Attendance Called	Attended	Man-days	Name of Mills
1.	5	21.11.82	25.11.82	10	10	50	Sharmin Textile Mills
2.	5	28.11.82	2.12.82	18	16	80	Olympia Textile Mills
3.	5	5.12.82	9.12.82	17	14	70	Bawany Textile Mills
4.	5	5.12.82	9.12.82	20	20	100	Muslim Cotton Mills
5.	5	12.12.82	16.12.82	17	17	85	Olympia Textile Mills
6.	5	19.12.82	23.12.82	11	11	55	Sharmin Textile Mills
7.	5	26.12.82	30.12.82	19	19	95	Bawany Textile Mills

Number of courses conducted : 7 Courses

Total number of trainees called : 112 Trainees

Total number of trainees attended: 107 Trainees

Attendance percentage : 96%

Man-days : 535 Man-days

Appendix - 10

Courses' Curriculum

Bleaching and Mercerisation

1. Classification of Textile Fibres

2. Shearing - Machines operation, purpose, quality of production in comparison with singeing.

3. Singeing - Copper plate, Singeing Machines, Hot Cylinder Singeing & gas singeing machine (Kerosine - Petrol etc.)

   Advantage and disadvantages of different types use of natural gas for singeing machine advantage and disadvantage in Bangladesh. Adaptation of the present machines in BTMC to natural gas, recommendations for existing machineries to top quality productions.

4. Desizing - Sizing formulations, modifications necessary to avoid chemical damage of the yarn and fabrics in the weaving departments. Desizing agents(acid, alkali, steeping (water) and enzymes) Comparative studies of all different desizing agent available in Bangladesh. Testing for size content in fabric after desizing, testing schemes for different type of enzymes. Suitability of each type of enzyme in different BTMC mills. Automation of the operation locally.

5. Kier Boiling - Machineries (Open Kiers - closed or pressure Kier horizontal Kiers - vertical Kiers, radial Kiers) Operation, maintenance and Coating of Kiers. Filling manually and automatically. Precautions and operating instructions. Frequencies of Coating and maintenance. Chemical Background of the Kier boiling. Natural impurities in Cotton Fibre - removal of impurities repair of faulty work. Use of different chemicals for Kiering (advantage, disadvantages) Soft and hard water. Cleaning of heat exchangers and frequency maintenance of circulating pumps. Kier boiling of yarn, grey fabric and colored woven fabrics. Formulations and Standardisation of the process, analysis of the Kier liquor.

6. Bleaching (Hypochlorite) - Bleaching with Bleaching Powder in Bangladesh, manufacture of bleaching powder, difficulties and chemical damage of the fibre when using bleaching powder comparative study between bleaching powder and sodium hypochlorite.

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Recommendations for changing the current practice in BTMC mills to use new and better procedure involving sodium hypochlorite rather than bleaching powder. Formulation of recipes according to the machines available. Continuous and non-continuous bleaching, manufacture of Sodium Hypochlorite.

7. Bleaching with Hydrogen peroxide - Manufacturing of hydrogen peroxide, Comparison of bleaching with hypochlorite and peroxide. Coating Kiers for hydrogen peroxide. Chemical background of bleaching with hypochlorite and peroxides. Advantages of peroxide bleaching. Formulations for bleaching with H_2O_2 in Kiers and other machines chemical damages studies for H_2O_2 and hypochlorite bleaching of grey goods and colored woven goods, bleaching of yarn (mercerised, unmercerised) bleaching of mixed fabrics.

8. Continuous Bleaching - Machineries, continuous rope bleaching ranges open width bleaching ranges bleaching with combined system(hypochlorite peroxide systems).

Chemical calculations for continuous bleaching setting-up the machines, periodic testing, cleaning the ranges. Recommended formulae for different bleaching ranges. Preparation of stock solution, analysis and testing.

9. Mercerisation - Chemistry of mercerisation. Purpose of the process, chain mercerizing machine, chainless mercerization. Padless and chainless mercerizing machine, yarn mercerising machines. Yarn mercerization, Mercerization of Grey goods, mercerization of white and coloured goods. Cooling of mercerizing lye, recovery towers. Formulation and recommendations, measuring the degree of mercerization. Semi mercerization, full mercerization.

Appendix - 10(Contd.)

The Technology of Dyeing

1. Dyeing Machines - Jigs, Becks, Jets, Pressure becks, beam dyeing, cone dyeing, padding, continuous dyeing. Hank dyeing machine, tubs etc. Foam dyeing machines, Material used for dyeing machines.

2. Theory of Color and Chemical Constitution - What is dye, Chromoferes, Auxochrome, bathe, chrome, hypsochrome, wave length. Theories of dyeing, ionic bonds, covalent bonds, Polarity Planarity, adsorbtion and absorbtions of dyes, desorbtion of dyes.

3. Direct Dyes - Classification of direct dyes, dyeing procedures. Dyeing with direct dyes use of different machines for dyeing, after-treatment of direct dyes. Preparation of the dye bath, chemicals and auxiliaries used for direct dyes, fastness properties.

4. Sulpher Dyes - Chemistry of Sulpher dyes, application, fastness properties, Dyeing procedures, use of solible sulpher dyes. Requirements of equipments for sulpher dyes, damage caused by sulpher dyes defects and repairs of Sulpher dyed fabric, economy of Sulpher dyes. Reducing chemicals for sulpher dyes. Comparison of Sulpher and vat dyes.

5. Vat Dyes - Chemistry of vat dyes, Classification, manufacture reducing agents, fastness properties, dyeing procedures. Hank dyeing, Jig dyeing, beck dyeing, beam dyeing, cone dyeing, continuous dyeing. Preparation of vats, Oxidation of vat dyes, soaping and finishing of vat dyes, fastness properties of vat dyes, use of graphs and tables in vat dyes.

6. Azoic Dyes - Chemistry of azoic dyes, application, naphtolating. Diazotization and coupling, bases, salts, fastness properties. Drying after padding, use of formaldehyde in padding. Improving the rubbing fastness of azoic dyes. Formulations of the dye bath. Calculations of chemicals, auxiliaries and dyestuffs.

7. Solible-vat Dyes - Chemistry, manufacture of solible vats, application by discontinuous dyeing machines, continuous dyeing. Sodium Nitrite, Sulphuric acid, preparation of Nitrous acid, washing and soaping, fastness properties, economics of solible vat dyestuffs.

Appendix - 10(Contd.)

3. Reactive Dyes - Chemistry of reactive dyes, classification. Highly reactive fibre reactive dyes, low reactive dyes, dyeing procedures, chemical reaction with water, chemical reaction with fibres dyeing by exhausion. Pad-dyeing, fastness properties. Formulations. Correction of faulty dyeings stripping. Effect of alkali and acids.

The Technology of Printing

1. Roller Printing - Relief printing, offset printing, Intaglio printing, Single Roller machines, Multiroller machines, Sari or Jumper and duplix printing machines, setting-up the machines production standard sharpening docter blades, preparation of fabric for printing. Use of lapping Blankets of different types, stitching of balnkets, Limitations of roller printing (Repeat size, width of fabric, crushing of colors etc.)

2. Engraving - Hand Engraving, Mill or machine engraving(engraving the die, engraving the mill, engraving the cupper rollers). Pentagraph engraving(enlargement of the design, tracing the design on the zinc plate used of different gravers. Pentagraph machines, setting the repeat, tracing the design on the cupper roller, heating the roller, varnish, application, compesition of acid, resist varnish. Making the scale. Nitric acid, iron perchloride, removing the varnish. Removing the design from the roller, use of die for making the scale. The allowance in relation of the fabric construction. Photo-engraving, use of emulsion exposure developing.

3. Screen Printing - Making the frames (wood, metals), Gauze fabric(Cotton, organdi, silk, phospher bronze, stainless steel gauze, Nylon gauze, polyester gauze (mono filament and multi-filament) stretching of the screens (Hand stretching, machine stretching), Scouring the gauze, coating with photo emulsion, drying, preparation of the dia positives copying developing, reinforcing the screen. Making the printing tables. Covering the table use of the adhesives (Permanent, semi permanent), sequegee (wood, rubber) Semi-automatic and fully automatic printing machines.

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4.	Rotary Screen Printing	- Rotary machines, feeding, drying, washing. Advantages over the roller printing machines, manufacturing of the rotary screens, engraving the screens, different types of squeeges, photographic engraving, Direct galvano design, types of rotary screen printing machines.
5.	Printing Procedures	- Preparation of print pastes. Preparation of printing colors. Printing, Drying, Steaming. Use of saturated steam. Superheated steam. Pressure steaming. Baking (dry heat) wet development.
6.	After-treatment of the Prints	- Anionic detergent, nonionic detergent oxidation, recommended washing, procedure for vats, reactives disperse-azoics, acid, premetalised, chrome. Fibre reactive, direct dyes, washing off cotton, Nylon, Polyester, quiana, acetate, acetate/Nylon, Polyester/Cotton, Wool etc.
7.	Thickening Agents	- Classification of thickening agents, chemistry of thickeners, natural thickeners, modified and synthetic thickeners, physical and chemical properties of thickeners, suitability of different thickeners of different classes of dye, viscosity measurements. Emulsions and their Chemistry, dispersing agents, emulsifying agent, oil in water emulsions, water in oil emulsions, use of semi-emulsions.
8.	Printing with Azoic Dyes	- Azoic dyes, preparation with grounders, preparation of thickeners, preparation of printing colors, printing development, use of coupling agent, preparation of the diazonium salts, use of salts, washing.
9.	Printing with Rapid Fast Colors	- Color preparation, printing steaming and after-treatment.
10.	Printing with Rapidogens	- Chemistry of rapidogens, preparation of the printing colours, printing fixation and after-treatment.
11.	Printing with Fibre reactive dyes	- Chemistry of reactive dyes, reaction with thickners, reaction with water, reaction with cellulose, choosing thickeners, preparation of colours, application fixation, after-treatment of prints.

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12. Printing with Pigments - Chemistry of pigment colors, emulsions, preparation of the thickeners, printing, Baking or fixation by steam after-treatments.

13. Printing with Vat - Chemistry of vat dyes, classification, thickeners, all in process, flash ageing, regular steaming, discharge and resist print, printing, drying, different steaming processes, oxidation, soaping and washing.

The Technology of Finishing

1. Finishing Machines - Stretching devices(scroll opener, curved rubber expander, mycock expander), Finishing ranges, Drying textile fabrics, Vertical drying cylinders, horizontal drying cylinders, hot air machines(hurricane loop drier, air-lay drier, the cell drier), stenters, pin frames, clip frames, air circulation in stenters, infra-Red drying, Conditioning and damping machines, Mangling, Calanders, chasing calenders, swizzing calenders, Friction calender, Schreiner calender, Embossing calenders, Tampening machine, Raising machines.

2. Calendering - Relation between luster and calendering fastness of luster to washing, effect of moisture on calendering luster produced by schreinering process, Moire lustre finish, linen finish, spun-glass finish.

3. Optical Bleaching- Fluorescent whitening agents, diaminostilbene disulphonic acid and its derivatives, Blankophor B changes of wave length produced by optical bleaching agents, selection of fluorescent whitening agents, Application by exhausion application by padding, Addition to other finishing agents(softening, Resin finishes etc.), trouble involved and how to solve them, Limitations involved in use of different whitening agents, use of carrier fluorescent agents. Fluorescent whitening agents and resin finishing.

4. Softening - Methods of softening, mechanical softening, softening produced by distorsion, Decatizing, use of palmer machines, softening with chemical auxiliaries. Softening agents, use of oils, fats, waxes, soaps, olive oil, Turkey Red Oil, use of Monopol Soap. Application of synthetic softeners by continuous and discontin-

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-uous methods. Selection of softening agents according to method of application.

5. Stiffening and Weighing - The relation between body and stiffness, acid stiffened cotton fabrics, the use of acetate in stiffening(Turbenized articles), the use of synthetic resin for stiffening, use of starch in stiffening, weighing using starch, flour barium sulphate, french chalk, china clay, sodium and magnesium sulphate.

6. Crease Resistant finishes and Resin finishing of Textile Material - Urea- formaldehyde Condensates(Formation of mono and dimethylol Urea), dispersion, Resistance to creasing, uncreasing tests, crease resistance and shower proof, alternatives to urea(Melamine), the crease resisting product, crease resistance, moisture absorption, shrinkage, fastness to dyestuffs.

Resin application in relation to fibre structure, chemicals and processes used, choice of resins, the use of Catalysts, application of resins to the fabrics (Impregnation, Drying, Curing, Washing). Preservation of tear strength and resistance to abrasion in resin finished fabrics, formaldehyde odour in resin finished fabrics.

7. Water Proofing - Water proofing with rubber films, synthetic resins, machines used for coating, water repellent finishes, use of aluminum sulphate or acetate, use of Myrtolene.

8. Fabric Pilling - Causes of pilling in the fabrics, methods of reducing pilling.

9. Water and Oil Repellent Finishes - The use of trimethyl floride, application of organo, florocarbon chemicals. The Quarpel finish, the use of schotchgard mixture with steeramidopyridinium chloride and its economy.

10. Wind and Rain proof finishes - Effect of swelling, closing spaces between the fibres and threads.

11. Wash and Wear Finishing - Use of crease resist finishes, use of swelling agents, Use of caustic soda and nitric acid.

12. Protective finishes against moth, insects funji and Bacteria.	Moth proofing, use of campher, naphthalene, use of moth proofing agents, sodium floride, titanium fluoride, aluminum fluoride. Triethanolamine silico fluoride, the use of Lanoc CM, Mittin FF, DDT. Protective treatment against micro-organisms using phenol, formaldehyde, chlorophenol and salicylanilide, modification based on cyanoethylation of cotton fibre to immunise it against micro-organisms.