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MINISTRY OF LABOR AND SKILLS

TEXTILE PROCESSING TECHNOLOGY

LEVEL – I

TVET CURRICULUM

Based on February, 2022 (V- I) Occupational standard (OS)

March, 2022

Addis Abeba, Ethiopia

Preface

The reformed TVET-System is an outcome-based system. It utilizes the needs of the labor market and occupational requirements from the world of work as the benchmark and standard for TVET delivery. The requirements from the world of work are analyzed and documented – taking into account international benchmarking – as occupational standards (OS).

In the reformed TVET-System, curricula and curriculum development play an important role with regard to quality driven comparable TVET-Delivery. The Curricula help to facilitate the training process in a way, that trainees acquire the set of occupational competences (skills, knowledge and attitude) required at the working place and defined in the occupational standards (OS).

This curriculum has been developed by a group of professional experts from different Regional TVET Bureaus, colleges, Industries, Institutes and universities based on the occupational standard for Textile Processing Technology Level I**.**

The curriculum development process has been actively supported and facilitated by **Ministry of Labor and Skills.**

TVET-Program Design

TVET-Program Title: Textile Processing Technology **Level I**

1.1. TVET-Program Description

The Program is designed to develop the necessary knowledge, skills and attitude of the trainees to the standard required by the occupation. The contents of this program are in line with the occupational standard. The Trainees who successfully completed the Program will be qualified to work as a Textile Processer with competencies elaborated in the respective OS. Graduates of the program will have the required qualification to work in the **Industry** sector in the field of **Textile processing Technology.**

The prime objective of this training program is to equip the Trainees with the identified competences specified in the OS. Graduates are therefore expected to identify production process and organizational structure in textile processing unit, Identify inputs for textile processing, Perform handling of materials and load shifting equipment, Perform Pretreatment Operations, Perform dyeing operations, Perform printing operations, Perform final finishing operations and Apply 5S Procedures in accordance with the performance criteria and evidence guide described in the OS.

1.2. TVET-Program Training Outcomes

The expected outputs of this program are the acquisition and implementation of the following units of competences:

IND TPT1 01 1221 Identify production process and organizational structure in textile processing unit

IND TPT1 02 1221 Identify inputs for textile processing

IND TPT1 03 1221 Perform handling of materials and load shifting equipment

IND TPT1 04 1221 Perform Pretreatment Operations

IND TPT1 05 1221 Perform dyeing operations

IND TPT1 06 1221 Perform printing operations

IND TPT1 07 1221 Perform final finishing operations

IND TPT1 08 1221 Apply 5S Procedures

1.3. Duration of the TVET-Program

The Program will have duration of ***678 hours*** including the on school/ Institution training and on-the-job practice or cooperative training time. Such cooperative training based on

realities of the industry, nature of the occupation, location of the TVET institution, and other factors will be considered in the training delivery to ensure that trainees acquire practical and workplace experience.

s.no	Unit competency	TVET Institution training		Cooperative training	Total hours	Remarks
		Theory	Practical			
1.	Identify production process and organizational structure in textile processing unit	46	4	16	**66**	
2.	Apply 5S Procedures	24	8	8	**40**	
3.	Identifying inputs for textile processing	18	32	10	**60**	
4.	Performing handling of materials and load shifting equipment	30	10	10	**50**	
5.	Perform Pretreatment Operations	36	28	48	**112**	
6.	Performing dyeing operations	30	30	60	**120**	
7.	Perform printing operations	40	32	48	**120**	
8.	Perform final finishing operations	30	30	50	**110**	
	Total	254	174	250	**678**	

1.4. Qualification Level and Certification

Based on the descriptors elaborated on the Ethiopian National TVET Qualification Framework (NTQF) the qualification of this specific TVET Program is Level I**.**

The trainee can exit after successfully completing the modules in one level and will be awarded the equivalent institutional certificate on the level completed. However, only institutional certificate of training accomplishment will be awarded.

1.5. Target Groups

Any citizen **with or without disability** who meets the entry requirements under items 1.7 and capable of participating in the training activities is entitled to take part in the Program.

1.7 Entry Requirements

The prospective participants of this program are required to possess the requirements or directive of the **Ministry of Labor and Skills**.

1.8 Mode of Delivery

This TVET-Program is characterized as a formal Program on middle level technical skills. The mode of delivery is co-operative training. The time spent by the trainees in the real work place/ industry will give them enough exposure to the actual world of work and enable them to get hands-on experience.

The co-operative approach will be supported with school-based lecture-discussion, simulation and actual practice. These modalities will be utilized before the trainees are exposed to the industry environment.

Hence based on the nature of the occupation, location of the TVET institutions, and interest of the industry alternative mode of cooperative training such as apprenticeships, internship and traineeship will be employed. In addition, in the areas where industry is not sufficiently available the established production and service centers/learning factories in TVET institutions will be used as cooperative training places. The Training-Institution and identified companies have forged an agreement to co-operate with regard to the implementation of this program.

1.9. TVET-Program Structure

Unit of Competence		Module Code & Title		Training Outcomes	Duration (In Hours)
IND TPT1 01 1221	Identify production process and organizational structure in textile processing unit	**IND TPT1 M01 0222**	Identifying production process and organizational structure in textile processing unit	▪ Identify the organizational structure within textile processing unit ▪ Identify relevant legislation and guidelines ▪ Identify production processes and supply chains ▪ Describe workplace processes ▪ Learn skills for productive work ▪ Manage own work	66
IND TPT1 08 1221	Apply 5S Procedures	**IND TPT1 M02 0222**	Applying 5S Procedures	▪ Prepare for work ▪ Sort items ▪ Set all items in order ▪ Perform shine activities ▪ Standardize 5S ▪ Sustain 5S	40
IND TPT1 02 1221	Identify inputs for textile processing	**IND TPT1 M03 0222**	Identifying inputs for textile processing	▪ Determine job requirements ▪ Identify types and characteristics of textile materials ▪ Identify textile processing methods ▪ Describe methods of textile process methods ▪ Handle and store materials	60
IND TPT1 03 1221	Perform handling of	**IND TPT1 M04 0222**	Performing handling of materials and load	▪ Identify inputs for textile processing ▪ Perform general production- tasks and	50

	materials and load shifting equipment		shifting equipment	Determine job requirements ▪ Perform general cleaning duties and pre-checkup of equipment ▪ Operate and monitor load shifting equipment ▪ Assist in transfer or removal of materials or products where required ▪ Complete documentation	
IND TPT1 04 1221	Perform Pretreatment Operations	**IND TPT1 M05 0222**	Performing Pretreatment Operations	▪ Determine job requirements ▪ Understand Pre-treatment processes ▪ Set up and load pre-treatment equipment ▪ Operate and monitor pre-treatment machines and equipment ▪ Remove product and dispatch	112
IND TPT1 05 1221	Perform dyeing operations	**IND TPT1 M06 0222**	Performing dyeing operations	▪ Determine job requirements ▪ Understand Dyeing processes ▪ Set up and load machine ▪ Operate and monitor dyeing machine ▪ Complete dyeing operations ▪ Check dye outcomes	120
IND TPT1 06 1221	Perform printing operations	**IND TPT1 M07 0222**	Performing printing	▪ Determine job requirements ▪ Understand Printing processes ▪ Set up and load machine ▪ Operate and monitor printing machine ▪ Complete printing operations	120

IND TPT1 07 1221	Perform final finishing operations	**IND TPT1 M08 0222**	Performing final finishing operations	▪ Determine job requirements ▪ Understand Finishing processes ▪ Set up and load finishing machine or equipment ▪ Operate and monitor finishing machines or equipment ▪ Remove product and dispatch ▪ Complete records	110

*The time duration (Hours) indicated for the module should include all activities in and out of the TVET institution.

1.10 Institutional Assessment

Two types of evaluation will be used in determining the extent to which training outcomes are achieved. The specific training outcomes are stated in the modules. In assessing them, verifiable and observable indicators and standards shall be used.

The ***formative assessment*** is incorporated in the training modules and form part of the training process. Formative evaluation provides the trainee with feedback regarding success or failure in attaining training outcomes. It identifies the specific training errors that need to be corrected, and provides reinforcement for successful performance as well. For the teacher, formative evaluation provides information for making instruction and remedial work more effective.

Summative Evaluation the other form of evaluation is given when all the modules in the program have been accomplished. It determines the extent to which competence have been achieved. And, the result of this assessment decision shall be expressed in the term of institutional Assessment implementation guidelines..

Techniques or tools for obtaining information about trainees' achievement include oral or written test, demonstration and on-site observation.

1.11 TVET Teachers Profile

The teachers conducting this particular TVET Program are B - Level and above who have satisfactory practical experiences or equivalent qualifications.

LEARNING MODULE 01
TVET-PROGRAMME TITLE: **Textile Processing Technology Level I**
MODULE TITLE: Identifying production process and organizational structure in textile processing unit
MODULE CODE: **IND TPT1 M01 0222**
NOMINAL DURATION: 66 Hours
MODULE DESCRIPTION: This module covers the skills and knowledge to identify key production processes within textiles processing units.

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1. Identify the organizational structure within textile processing unit

LO2. Identify relevant legislation and guidelines

LO3. Identify production processes and supply chains

LO4. Describe workplace processes

LO5. Learn skills for productive work

LO6. Manage own work

MODULE CONTENTS:

LO1. Identify the organizational structure within textile processing unit

1.1 Identifying relevant positions within the textile industry.

1.2 Identifying Industry representatives and personnel roles

1.3 Industry terminology and acronyms

LO2. Identify relevant legislation and guidelines

2.1 Textile sector's Relevant legislation and guideline

2.2 Identifying rights, responsibilities and legal obligations

2.3 Identifying concepts of product quality

2.4 Identifying instructions and procedures in a quality system

2.5 Identifying production employability skills

LO3. Identify production processes and supply chains

3.1 Identifying workplace materials

3.2 Identifying workplace production processes.

3.3 Identifying workplace supply chains.

LO4. Describe workplace processes

4.1 Identifying workplace practices

4.2 Describing workplace key activities

4.3 Identifying key personnel and their roles

4.4 Identifying OHS practices

4.4.1 Hazard identification and control

4.4.2 Risk assessment

4.4.3 Implementation of risk reduction measures

4.5 Identifying production workplace areas and their roles

4.6 Recording and reporting accidents and incidents

LO5. Learn skills for productive work

5.1 Identifying current work required skills

5.2 Identifying skill limitations

5.3 Identifying skill development opportunities

5.4 Developing learning skills Plan

5.5 Participating in learning and development activities

LO6. Manage own work

6.1 Taking own work's tasks and role responsibility

6.2 Using improvements initiative in own work processes

6.3 Using problem-solving strategies

6.4 Monitoring own work

6.5 Working effectively and cooperatively in team

Learning Methods:

- Lecture and Discussion
- Demonstration
- Simulation
- Role playing

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

ASSESSMENT CRITERIA:

LO1. Identify the organizational structure within textile processing unit

- Relevant positions within the textile industry are identified.
- Industry representatives and personnel and their roles are identified.

LO2. Identify relevant legislation and guidelines

- Relevant legislation and guidelines common to employment within the textile sector are identified.
- Rights, responsibilities and legal obligations are identified.
- Concepts of product quality in workplace are identified.
- Instructions and procedures are identified in a quality system
- Employability skills for workplace production are identified

LO3. Identify production processes and supply chains

- Workplace materials are identified.
- Workplace production processes for converting materials into products are identified.
- Workplace supply chains for products are identified

LO4. Describe workplace processes

- Workplace practices are identified.
- Key activities of workplace are described.
- Key personnel and their roles are identified.
- OHS practices are identified.
- Workplace areas or departments and their role in the production process are identified.

LO5. Learn skills for productive work

- Required skills for current work role are identified.
- Skill limitations are identified.
- Opportunities for further skill development are identified.
- Plan for learning required skills is developed with or accepted from the supervisor.
- Learning and development activities are participated in.

LO6. Manage own work

- Responsibility is taken for own work tasks and role.

- Initiative is used to articulate ideas and suggestions for improvements in own work processes
- Problem-solving strategies are used to address problems, inconsistencies or concerns when fulfilling work role
- Own work is monitored against workplace standards and areas for improvement identified and acted upon.
- Work effectively and cooperatively with others in work team.

Annex: Resource Requirements

IND TPT1 M01 0222: Identifying production process and organizational structure in textile processing unit				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	**Learning Materials**			
1.	TTLM	Containing: Learning guide, teachers guide and Assessment Packet	1 pcs	1:25
2	Reference book			
2.1	Complete Technology Book on Textile Processing with Effluent Treatment	NIIR Board, 2003	5 pcs	1:5
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	Area- 7m*8m	1	1:25
2.	Library	Area- 30X30m	1	1:25
C.	**Consumable Materials**			
1.	Paper	A4	1dusta	1:25
2.	Marker	Non-permanent white board marker	2pack	2:25
D.	**Tools and Equipments**			
4	Computer	▪ RAM Size: 12 GB ▪ Processor Speed: 2.93 GHz ▪ Features: Built-in Speakers ▪ Processor: Intel Xeon 8-Core ▪ Graphics Processing Type: Dedicated Graphics ▪ Operating System: Windows 10 Pro ▪ Connectivity: USB 2.0, Display Port ▪ Maximum RAM Capacity: 48 GB	1 pcs	1:25

		▪ Hard Drive Capacity: 500 GB ▪ Max Turbo Frequency: 3.33 Ghz		
5	LCD Projector	▪ Compatible Operating System: Android and Windows operating systems ▪ Native Resolution: 1920x1080 ▪ Resolution: 1080p ▪ Display Technology: LED ▪ Contrast Ratio: 100000:1 ▪ Aspect Ratio: 16:9 ▪ Features: Built-in Speakers ▪ Image Brightness: 600 ANSI Lumens ▪ Connections: USB ▪ Dimension: 170 x 170 x 49 mm	1 pcs	1:25

LEARNING MODULE 02
TVET-PROGRAMME TITLE: **Textile Processing Technology Level I**
MODULE TITLE: Applying 5S Procedures
MODULE CODE: **IND TPT1 M02 0222**
NOMINAL DURATION: 40 Hours
MODULE DESCRIPTION: This module covers the knowledge, skills and attitude required to apply 5S techniques to his/her workplace. It covers responsibility for the day-to-day operations of the workplace and ensuring that continuous improvements of Kaizen elements are initiated and institutionalized.

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1. Prepare for work

LO2. Sort items

LO3. Set all items in order

LO4. Perform shine activities

LO5. Standardize 5S

LO6. Sustain 5S

MODULE CONTENTS:

LO1. Prepare for work

1.1 Using work instructions

1.2 Reading and interpreting Job specifications

1.3 Preparing and using 5S tools and equipment

1.4 Identifying and checking safety equipment and tools

1.5 Preparing and using Kaizen Board

LO2. Sort items

2.1 Preparing sorting plan

2.2 Performing Cleaning activities

2.3 Identifying workplace items

2.4 Listing necessary and unnecessary items

2.5 Using red tag strategy

2.6 Evaluating and placing unnecessary items

2.7 Recording and quantifying necessary items

2.8 Reporting performance results

2.9 Checking necessary items in the workplace

LO3. Set all items in order

3.1. Preparing set in order plan

3.2. Performing general cleaning activities

3.3. Deciding location/Layout, storage and indication methods

3.4. Preparing and using necessary tools and equipment

3.5. Placing items in their assigned locations

3.6. Returning used items

3.7. Reporting performance results

3.8. Checking each item's location and order

LO4. Perform shine activities

4.1. Planning shine activities

4.2. Preparing and using necessary tools and equipment

4.3. Implementing shine activity

4.4. Reporting performance results

4.5. Conducting regular shining activities

LO5. Standardize 5S

5.1. Planning and using standardize 5S activities

5.2. Preparing and implementing tools and techniques

5.3. Following and reporting standardize activities checklists

5.4. Keeping standard workplace

5.5. Avoiding problems by standardizing activities

LO6. Sustain 5S

6.1. Planning and following 'sustain 5S' activities

6.2. Discussing, preparing and implementing Tools and techniques

6.3. Inspecting standard and sustainable workplace

6.4. Cleaning workplace

6.5. Identifying compliance Situations

6.6. Recommending Improvements

6.7. Following Checklists and reporting

6.8. Avoiding Problems by sustaining activities

Learning Methods:
▪ Lecture and Discussion ▪ Demonstration ▪ Simulation ▪ Role playing
Assessment Methods:
▪ Written test ▪ Oral questioning ▪ Practical demonstration

ASSESSMENT CRITERIA:

LO1. Prepare for work

- Work instructions are used to determine job requirements, including method, material and equipment.
- Job specifications are read and interpreted following working manual.
- OHS requirements, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work.
- Tools and equipment are prepared and used to implement 5S.
- Safety equipment and tools are identified and checked for safe and effective operation.
- Kaizen Board (Visual Management Board) is prepared and used in harmony with different workplace contexts.

LO2. Sort items

- Plan is prepared to implement sorting activities
- Cleaning activities are performed
- All items in the workplace are identified following the appropriate procedures
- Necessary and unnecessary items are listed using the appropriate format
- Red tag strategy is used for unnecessary items
- Unnecessary items are evaluated and placed in an appropriate place other than the workplace
- Necessary items are recorded and quantified using appropriate format
- Performance results are reported using appropriate formats
- Necessary items are regularly checked in the workplace

LO3. Set all items in order

- Plan is prepared to implement set in order activities
- General cleaning activities are performed
- Location/Layout, storage and indication methods for items are decided
- Necessary tools and equipment are prepared and used for setting in order activities.
- Items are placed in their assigned locations
- After use, the items are immediately returned to their assigned locations
- Performance results are reported using appropriate formats
- Each item is regularly checked in its assigned location and order

LO4. Perform shine activities

- Plan is prepared to implement shine activities

- Necessary tools and equipment are prepared and used for shinning activities
- Shine activity is implemented using appropriate procedures
- Performance results are reported using appropriate formats
- Regular shining activities are conducted

LO5. Standardize 5S

- Plan is prepared and used to standardize 5S activities.
- Tools and techniques to standardize 5S are prepared and implemented based on relevant procedures.
- Checklists are followed for standardize activities and reported to relevant personnel.
- The workplace is kept to the specified standard
- Problems are avoided by standardizing activities

LO6. Sustain 5S

- Plan is prepared and followed to sustain 5S activities
- Tools and techniques to sustain 5S are discussed, prepared and implemented based on relevant procedures
- Workplace is inspected regularly for compliance to specified standard and sustainability of 5S techniques
- Workplace is cleaned up after completion of job and before commencing next job or end of shift
- Situations are identified where compliance to standards is unlikely and actions specified in procedures are taken
- Improvements are recommended to lift the level of compliance in the workplace
- Checklists are followed to sustain activities and report to relevant personnel
- Problems are avoided by sustaining activities

Annex: Resource Requirements

IND TPT1 M02 0222 : Applying 5S Procedures				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	**Learning Materials**			
1.	TTLM	Containing learning guide, teachers guide and Assessment Packet	1 pcs	1:25
2.	Journals/Publication/Magazines			
2.1	Applying the kaizen methods and the 5S technique in the activity of post-sale services in the knowledge based organization	Mihail Aurl, Costantin operan And Daniel Gercu; Hong kong 2010	1 pcs	1:25
B.	**Learning Facilities & Infrastructure**			
1.	Lecture rooms with full facilities	8m*7m	1	1:25
2.	Library	5m*4m	1	1:25
C.	**Consumable Materials**			
1.	Soap	200gm	25 pcs	1:1
2.	Gloves	Medical type	125 pcs	1:5
3.	Face mask	Medical type	125 pcs	1:5
D.	**Tools and Equipment**			
1.	Workshop (laboratory)	Textile processing	1	1:25
2	Demonstration site	Any textile processing unit/pilot plant	1	1:25

LEARNING MODULE 03
TVET-PROGRAMME TITLE: **Textile Processing Technology Level I**
MODULE TITLE: **Identifying inputs for textile processi**ng
MODULE CODE: **IND TPT1 M03 0222**
NOMINAL DURATION: 60 Hours
MODULE DESCRIPTION: This module covers the skills and knowledge to identify fibers, yarns, fabrics and textile chemicals and how they are used in textile processing production. These include a range of natural and synthetic materials which may be used for spun, knitted, tufted, woven or nonwoven products.

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1: Determine job requirements

LO2: Identify types and characteristics of textile materials

LO3: Identify textile processing methods

LO4: Describe methods of textile process methods

LO5: Handle and store materials

MODULE CONTENTS:

LO1. Determine job requirements

1.1. Standard operating procedures (SOPs)

1.2. Complying with work health and safety (WHS)

1.3. Using personal protective equipment (PPE)

1.4. Identifying job requirements

LO2. Identify types and characteristics of textile materials

2.1 Preparing work area

2.2 Identifying fibers types

2.3 Identifying yarns types

2.4 Identifying fabric types

2.5 Identifying textile chemicals types

2.6 Identifying fibers, yarns, fabric or textile chemicals quality

2.7 Identifying textile material quality measuring method

2.8 Confirming and clarifying textile product requirements

LO3. Identify textile processing methods

3.1. Describing textile materials processes

3.2. Explaining processing stages purposes

LO4. Describe methods of textile process

4.1. Identifying textile products and their end uses

4.2. Identifying chemicals and their process methods

4.3. Identifying dyestuffs and their process methods

4.4. Identifying quality impact

LO5. Handle and store materials

5.1. Following safety procedures and work practices

5.2. Using load lifting equipment and techniques

5.3. Observing and using handling materials assistance

5.4. Storing materials

Learning Methods:

- Lecture and Discussion
- Demonstration
- Simulation
- Role playing

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

ASSESSMENT CRITERIA:

LO1. Determine job requirements

- Follow standard operating procedures (SOPs)
- Comply with work health and safety (WHS) requirements at all times
- Use appropriate personal protective equipment (PPE) in accordance with SOPs
- Identify job requirements from specifications, drawings, job sheets or work instructions

LO2. Identify types and characteristics of textile materials

- Prepare work area according to workplace procedures
- Types of fibers and yarns or fabric and textile chemicals used in the manufacture of textile products are identified.
- Quality of fibers, yarns, fabric or textile chemicals is identified.
- Methods of measuring textile material quality in the workplace are identified.
- Consult with supervisor or client to confirm and clarify product requirements

LO3. Identify textile processing methods

- Processes used on raw fibers, basic processed yarns or finished yarns and fabrics and garments are described.
- The purposes of processing stages are explained.

LO4. Describe methods of textile process methods

- Textile products and their end users are identified.
- Uses of different chemicals, dyestuffs and their process methods on the effects of finished products are identified.
- Impact of quality on production processes is identified

LO5. Handle and store materials

- Appropriate safety procedures and work practices are followed when examining stock in appropriate sits(racks or shelves)
- Safe working practices are followed when handling or moving stock
- Appropriate lifting equipment is used to lift heavy or awkward loads
- Appropriate posture and lifting techniques are used for manual handling of materials
- Assistance in handling materials is sought when necessary
- Materials are stored in accordance with enterprise standard practices and manufacturer's recommendations

Annex: Resource Requirements

IND TPT1 M03 0222 : Identifying inputs for textile processing				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A. Learning Materials				
1.	TTLM	Containing learning guide, teachers guide and Assessment Packet	1 pcs	1:25
2.	Reference Books			
2.1	Textile Manufacturing Processes	Faheem Uddin, (August 28th, 2019), reviewed June 11th, 2019P	25 pcs	1:25
2.2	Textile manufacturing process	http://dx.doi.org/10.5772/intechopen.87968	25 pcs	1:25
2.3	Text Book & Practical Manual	Shiksha Kendra	25 pcs	1:25
2.4	Jose Cegarra and Punte, Dyeing of textile materials,	Texille, 1993	25 pcs	1:25
2.5	SK Karmakar, Chemical technology in the pretreatment process of textile materials,	Elsevier, 1999.	25 pcs	1:25
2.6	RB Chavan, Chemical processing of hand loom fabrics	1999	25 pcs	1:25
B. Learning Facilities & Infrastructure				
1.	Lecture rooms	7m*8m	1	1:25
2.	Library	30m*30m	1	1:25
3	Work shop	30m*40m	1	1:25
C. Consumable Materials				
1.	Paper	A4	1 Dusta	1:25
2	Marker	Non-permanent white board marker	1pack	1:25
3	Fibers/yarn	Cotton, Wool, polyester, Nylon,	1Kg	1:25

		Acrylic etc		
4	Fabrics	Knitted, Woven and Non-woven etc.	10 m	2:25
5	Salt	Hardness: 150mg-400mg/ l Packing wt: 50Kg Color: White Grade: Industrial Type: Dyeing	1Kg	1:25
6.	Direct dye	Form: powder Solubility: soluble in water Solid content: 90 – 95% Usage: textile industry	1Kg	1:25
7.	Reactive dye	Form: powder PH 1% solution: 7.85 Solubility: 90^{o} c- 50g/l Solid content: 90 – 95% Usage: wool, nylon, cotton	1Kg	1:25
8.	Sulphur dye	Form: powder PH 1% solution: 10-11 To- 30 - 90o moisture: 6% max Solid content: 90 – 95% Purity: 95 – 98% Usage: textile dye stuffs	1Kg	1:25
9.	Soda ash	Form: powder PH 1% solution: > 12.5 + 1 Water solubility: easily dissolve in water Solubility: > 87% Stability: Anion Usage: textile dye stuffs	1Kg	1:25

D. Tools and Equipments

1.	Digital Weighing balance	Capacity: 220 gm Pan size: 80mm, power supply: 12V Division:0.0001g/0.1mg Wind glass			5pcs	5:25
2	Beaker	Capacity 50 ml	Diameter 4cm	Height 6cm	5pcs	5:25
		100 ml	5cm	7cm		

		250 ml	6cm	10cm		
		500 ml	8cm	12cm		
3	Pipet	Material: polystyrene Length: 348mm Capacity: 5ml			5pcs	5:25
4	Titrator	Water content: 0.1- 500mg H2O Concentration:10mg/l – 100%H2O Volume: 10 ml burette, discharge +-0.015mL, Repeatability +-0.005mL. Endpoint Detection: by polarized potential level detected with a twin platinum electrode.			1pcs	1:25
5	Spoon	Laboratory Spoon Spatula 150mm, stainless steel			10pcs	10:25
6	Thermometer	For kinematic viscosity Temperature range: 28.6 - 31.4℃ Length: 300 - 310mm Scale: 0.05℃ Immersion: Total immersion Material: Glass, mercury			5pcs	1:5
7	PH meter	Characteristics: value pH range: 0 to 14 pH pH Resolution: 0.01 pH pH Accuracy: 0.02pH TO Range: -5.0 – 60.0 OC Response time: <=1minute			5pcs	1:5
8	Laptop computer	Hp 8 GB ram			1pcs	1:25
9	Computer	▪ RAM Size: 12 GB ▪ Processor Speed: 2.93 GHz ▪ Features: Built-in Speakers ▪ Processor: Intel Xeon 8-Core ▪ Graphics Processing Type: Dedicated Graphics			1pcs	1:25

		▪ Operating System: Windows 10 Pro ▪ Connectivity: USB 2.0, Display Port ▪ Maximum RAM Capacity: 48 GB ▪ Hard Drive Capacity: 500 GB ▪ Max Turbo Frequency: 3.33 Ghz		
10	LCD Projector	▪ Compatible Operating System: Android and Windows operating systems ▪ Native Resolution: 1920x1080 ▪ Resolution: 1080p ▪ Display Technology: LED ▪ Contrast Ratio: 100000:1 ▪ Aspect Ratio: 16:9 ▪ Features: Built-in Speakers ▪ Image Brightness: 600 ANSI Lumens ▪ Connections: USB ▪ Dimension: 170 x 170 x 49 mm	1pcs	1:25

LEARNING MODULE- 04
TVET-PROGRAMME TITLE: **Textile Processing Technology Level I**
MODULE TITLE: **Performing handling of materials and load shifting equipment**
MODULE CODE: **IND TPT1 M04 0222**
NOMINAL DURATION: **50Hours**
MODULE DESCRIPTION: This module covers the skills and knowledge to perform tasks to handle materials and use load shifting equipment in association to its operational maintenance
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Perform general production- tasks and Determine job requirements **LO2.** Perform general cleaning duties and pre-checkup of equipment **LO3**. Operate and monitor load shifting equipment **LO4.** Assist in transfer or removal of materials or products where required **LO5.** Complete documentation
MODULE CONTENTS: **LO1. Perform general production- tasks and Determine job requirements** 1.1 . Clarifying duties and tasks 1.2 . Checking and organizing equipment and tools 1.3 Asking procedural and tasks questions 1.4 . Standard operating procedures(SOPs) 1.5 . Complying with work health and safety(WHS) 1.6 . Using personal protective equipment(PPE) 1.7 . Identifying job requirements **LO2. Perform general cleaning duties and pre-checkup of equipment** 2.1 . Clarifying cleaning duties 2.2 . Applying WHS practices 2.2.1 Hazard identification and control 2.2.2 Risk assessment 2.2.3 Implementation of risk reduction measures 2.3 Determining, preparing and using cleaning equipment 2.4 Implementing cleaning liquids handling, storage and disposal procedures

2.5 Assessing cleaning

2.6 Selecting load shifting device

2.7 Undertaking routine pre-use checks

2.8 Setting up work area and load shifting device

2.9 Reporting non-compliance

2.10 Performing minor maintenance

LO3. Operate and monitor load shifting equipment

3.1. Operating load shifting device

3.2. Lifting and placing loads

3.3. Using safe and efficient movement path

3.4. Checking and monitoring movement path

3.5. Environmental requirements and waste management procedures

LO4. Assist in transfer or removal of materials or products where required

4.1 . Receiving task requests

4.2 . Providing materials transfer assistance

4.3 Methods and manual handling techniques

LO5. Complete documentation

5.1 Relaying on work area operations information

5.2 Completing receipts records, dispatch and movement

5.3 Interpreting documentation

Learning Methods:

- Lecture and Discussion
- Démonstration
- Simulation
- Role playing

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

ASSESSMENT CRITERIA:

LO1. Perform general production- tasks and Determine job requirements

- Required duties and tasks are clarified with a supervisor or team member.
- Required equipment and tools are organized, and checked to confirm good working condition.
- Questions are asked to confirm procedures and ensure own knowledge and skill is adequate to perform tasks..
- Follow standard operating procedures(SOPs)
- Comply with work health and safety(WHS) requirements at all times
- Use appropriate personal protective equipment(PPE) in accordance with SOPs
- Identify job requirements from specifications, drawing job sheets or work instructions

LO2. Perform general cleaning duties and pre-checkup of equipment

- Cleaning duties are clarified to establish requirements.
- Personal safety equipment, where needed, is selected and used correctly according to WHS practices .
- Appropriate cleaning equipment for specific tasks is determined, prepared and used.
- Procedures for handling, storage and disposal of cleaning liquids are implemented according to manufacturer specifications.
- Cleaning is assessed against housekeeping requirements.
- Most appropriate load shifting device is selected based on type of work.
- Routine pre-use checks are undertaken in accordance with manufacturer specifications and regulatory safety requirements
- Set up and prepare work area according to workplace procedures and set up machine or process
- Non-compliance with specifications is reported for repair or replacement
- Load shifting device is prepared, started and used in accordance with all safety and enterprise standard procedures
- Load shifting device is stopped or shut down in accordance with all safety and enterprise standard procedures
- Minor maintenance are performed in accordance with manufacturer's specifications and/or enterprise procedures

LO3. Operate and monitor load shifting equipment

- Load shifting device is operated within design specifications and safe working load
- Load is lifted, ensuring balance, vision of operation and protection of load
- Loads are placed ensuring safety and stability and ensuring safety of materials and avoidance of hazards on site
- Safe and efficient path of movement is selected and used as per the manual.
- Path of movement is checked and monitored for obstacles and hazards, and safety is maintained
- Environmental requirements and procedures concerned with waste, pollution and reprocessing of materials are correctly applied at all stages of the process

LO4. Assist in transfer or removal of materials or products where required

- Requests are received and, where relevant, tasks are organized, confirmed and recorded according to specified procedures.
- Assistance is provided in transfer or removal of materials or products as required.
- Appropriate methods and manual handling techniques are used.

LO5. Complete documentation

- Information regarding operations in work area is correctly relayed to and from other operators, shift and supervisory personnel, as required
- Documentation is correctly interpreted and records of receipts, dispatch and movement correctly completed according to statutory requirements and enterprise standard procedures

Annex: Resource Requirements

IND TPT1 M04 0222: Performing handling of materials and load shifting equipment				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	**Learning Materials**			
1.	TTLM	Containing: Learning guide, teachers guide and Assessment Packet	1	1:25
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room[working area]	Area- 7m*8m	1	1:25
2.	Library	Area- 30m*30m	1	1:25
C.	**Consumable Materials**			
1.	Paper	A4	1dusta	1:25
2	White board marker	Erasable or temporary marker	1pack	1:25
3	Cleaning chemicals and detergents	Largo	5lt	1:5
4	Cleaning equipment	Plastic handle Broom	5	1:5
D.	**Tools and Equipment**			
1.	Trolley	▪ Weight capacity: 20-25Kg ▪ Style: foldable ▪ True material :steel	1pcs	1:25
2	Cart	▪ Product name: Stainless Steel Foldable Trolley ▪ Table Size: 50*70mm ▪ Wheel diameter: 100mm	1pcs	1:25

		▪ Loading: 150kg ▪ The total height of the vehicle body: 680mm ▪ Weight: 9.5kg		
3	Overhead cranes	Standard	1pcs	1:25
4	Computer	Desk top intelcor i7,4GB ram	1pcs	1:25
5	LCD Projector	▪ Compatible Operating System: Android and Windows operating systems ▪ Native Resolution: 1920x1080 ▪ Resolution: 1080p ▪ Display Technology: LED ▪ Contrast Ratio: 100000:1 ▪ Aspect Ratio: 16:9 ▪ Features: Built-in Speakers ▪ Image Brightness: 600 ANSI Lumens ▪ Connections: USB ▪ Dimension: 170 x 170 x 49 mm	1pcs	1:25

LEARNING MODULE 05
TVET-PROGRAMME TITLE: **Textile Processing Technology Level I**
MODULE TITLE: **Performing Pretreatment Operations**
MODULE CODE: **IND TPT1 M05 0222**
NOMINAL DURATION: **112** Hours
MODULE DESCRIPTION: This module covers the knowledge, attitudes and skills required to conduct pretreatment of textile materials to make them ready for dyeing and printing operations.

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1. Determine job requirements

LO2. Understand Pre-treatment processes

LO3. Set up and load pre-treatment equipment

LO4. Operate and monitor pre-treatment machines and equipment

LO5. Remove product and dispatch

MODULE CONTENTS:

LO1. Determine job requirements

1.1. Standard operating procedures (SOPs)

1.2. Complying with work health and safety (WHS) requirements

1.2.1. Hazard identification and control

1.2.2. Risk assessment and implementation

1.2.3. Risk reduction measures

1.3. Using appropriate personal protective equipment (PPE)

1.4. Identifying job requirements

LO2. Understand Pre-treatment processes

2.1 Understanding pretreatment processes technologies

2.2 Understanding Chemicals interaction

2.3 Understanding Chemicals interaction with textiles

2.4 Identifying Chemical & auxiliaries properties & functions

LO3. **Set up pre-treatment equipment**

3.1 Checking textile product quality

3.2 Reporting non-conforming materials

3.3 Loading textile product

3.4 Minor machine maintenance

LO4. Operate and monitor pre-treatment machines and equipment

4.1 Undertaking pretreatment process & machines operation

4.2 Monitoring pretreatment process

4.3 Checking pretreatment process product

4.4 Pretreatment product faults

4.5 Identifying minor product process and machine faults

4.6 Reporting major machine faults

LO5. Remove product and dispatch

5.1 Understanding product quality

5.2 Removing and dispatching product

5.3 Completing production records

Learning Methods:

- Lecture and Discussion
- Démonstration
- Simulation
- Role playing

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

ASSESSMENT CRITERIA:

LO1. Determine job requirements

- Follow standard operating procedures (SOPs)
- Comply with work health and safety (WHS) requirements at all times
- Use appropriate personal protective equipment (PPE) in accordance with SOPs
- Identify job requirements from specifications, drawings, job sheets or work instructions

LO2. Understand Pre-treatment processes

- Understand pretreatment processes, technologies and its significance.
- Interaction of Chemical s with each other & textiles are understood
- Properties & functions of Chemical s & auxiliaries used are identified

LO3. Set up and load pre-treatment equipment

- Textile product is checked for quality and conformity to specifications
- Non-conforming materials are reported
- Textile product is loaded into pretreatment machine according to the work procedure

LO4. Operate and monitor pre-treatment machines and equipment

- Pretreatment process & machines operation are undertaken according to workplace and work health and safety (WHS) requirements.
- Process is monitored to ensure product specifications and quality standards are achieved.
- Product is checked during and on completion of pretreatment process.
- Product faults are identified based on the specification.
- Minor product process and machine faults are identified and corrected where necessary to meet specified requirements and are reported.
- Major machine or product faults are reported

LO5. Remove product and dispatch

- Product is understood against quality standards.
- Product is unloaded or removed from pretreatment area according to specifications.
- Product is dispatched to the next processes.
- Cleaning of area is completed to ensure work environment is maintained in a safe and productive manner.
- Production records and other documentation are accurately completed.

Annex: Resource Requirements

IND TPT1 M05 0222: Performing Pretreatment Operations.						
Item No.	**Category/Item**	**Description/ Specifications**			**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	**Learning Materials**					
1.	TTLM	Containing learning guide, teachers guide and Assessment Packet			1pcs	1:25
2.	Reference Books					
2.1	Processing of cotton knitted fabrics	M. Chakraborty, Amit Dayal and M.L. Gulrajani, NITRA, 1998			1pcs	1:25
2.2	preparatory processes in textiles	A.K. Agrawal, Chemical, NCUTE, 2000.			1pcs	1:25
2.3	Chemical processing of hand loom fabrics	RB Chavan, 1999.			1pcs	1:25
B.	**Learning Facilities & Infrastructure**					
1.	Lecture rooms	7m*8m			1	1:25
3.	Library	30m*30m			1	1:25
4	Work shop	Standard size			1	1:25
B.	**Consumable Materials**					
1.	Yarn	Cotton, Wool, polyester, Nylon, Acrylic etc			1Kg	1:25
2	Fabrics	Knitted, Woven and Non-woven etc.			10 m	2:25
3	Dyes, chemicals and Auxiliaries					
3.1	H_2O_2	Criteria	35% Ap	50% Ap	25 liter	1:5
		WW% H2O2 concentration	35.1-35.8	50.1-50.8		
		%Stability	99.6	99.6		

		3HRS,96^{o}C(min)				
		PH(max)	2.4	1.6		
		Sp Gravity@25^{o}c $\pm$ 1^{O} (min)	1.13	1.19		
		Appearance	Clear	Clear		
3.2	NaOH	Form	Deliquescent		25 kg	1:5
		Boiling Point (^{O}C)	1390			
		Melting Point (^{O}C)	318			
		Solubility(water)	Soluble with evolution of heat			
		Specific gravity	2.13(water=1 at 4^{O}C)			
		Bulk Density (g/ml)	1.175			
3.3	Wetting agent	Grade Standard	Technical Standard		25 liter	1:5
		packaging	100ml/250ml/500 ml/1lit/&200lit			
		Form	Liquid			
		Purity in %	100%			
		Dosing	20-40ml in 15 liter water			
C.	**Tools, equipment and machineries**					
1.	Digital Weighing balance	Display type :(LCD) Capacity: 220 gm Pan size: 80mm, power supply:			1pcs	1:25

		12V Division: 0.0001g/0.1mg Wind glass				
2.	Beaker	Capacity 50 ml 100 ml 250 ml 500 ml	Diameter 4 cm 5cm 6cm 8cm	Height 6cm 7cm 10cm 12cm	1pcs	1:25
3.	Pipet	Material: polystyrene Length: 348mm Capacity: 5ml			5pcs	1:5
4.	Titrator	Water content: 0.1- 500mg H_2O Concentration:10mg/l – 100%H_2O Volume: 10 ml burette, discharge +-0.015mL, Repeatability +-0.005mL. Endpoint Detection: by polarized potential level detected with a twin platinum electrode.			1pcs	1:25
5.	Spoon	Laboratory Spoon Spatula 150mm, stainless steel			5 pcs	1:5
6.	Thermometer	For kinematic viscosity Temperature range: 28.6 - 31.4℃ Length: 300 - 310mm Scale: 0.05℃ Immersion: Total immersion Material: Glass, mercury			5 pcs	1:5
7.	PH meter	Characteristics: value pH range: 0 to 14 pH pH Resolution: 0.01 pH			5 pcs	1 1:5

		pH Accuracy: 0.02pH T^{O} Range: -5.0 – 60.0 ^{O}C Response time: <=1minute		
8.	Sample pretreatment & dyeing machines	Cooling : Air force Cooling Heating: Through Infra red Radiation M/C type: Automatic Automation: Micr oprocessor controller DC4F/R (DC10 F/R) Available Beaker capacity: 75ml, 100ml, 150ml, 200ml, 250ml, 500ml,100ml, 6000ml,10000ml	1pcs	1:25
9.	yarn pretreatment & dyeing machine	Material: Stainless steel Capacity: 30kg – 1000kg Usage: yarn dyeing M/C type: Automatic Shape: Round	1pcs	1:25
10	Washing & squeezing machine	Capacity: 200kg – 500kg High temp up to 140^{O}C Working presser: 4kg/cm2 A Direct Steam heat M/C type: Automatic & semi automatic	1pcs	1:25
11.	Drying machine	Dryer type: electric dryer Frequency: 50/60 Hz Phase: single phase Voltage: 220 – 440V Automation Grade: Automatic	1pcs	1:25

LEARNING MODULE 06
TVET-PROGRAMME TITLE: **Textile Chemical Processing Technology Level I**
MODULE TITLE : **Performing dyeing operations**
MODULE CODE : **IND TPT1 M06 0222**
NOMINAL DURATION : 120 Hours
MODULE DESCRIPTION : This unit covers the knowledge, attitudes and skills required to conduct dyeing of textile materials to make them ready for finishing.

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1. Determine job requirements

LO2. Understand dyeing processes

LO3. Set up and load machine

LO4. Operate and monitor dyeing machine

LO5. Complete dyeing operations

LO6. Check dye outcomes

MODULE CONTENTS:

LO1. Determine job requirements

1.1. Standard operating procedures (SOPs)

1.2. Complying with work health and safety (WHS)

1.2.1 Hazard identification and control

1.2.2 Risk assessment and implementation

1.2.3 Risk reduction measures

1.3. Using appropriate personal protective equipment (PPE)

1.4. Identifying job requirements

LO2. Understand Dyeing processes

2.1. Understanding dyeing processes , technologies and its significance

2.2. Understanding dyeing environmental effects and its significance.

2.3. Understanding interaction of dyes

2.4. Understanding interaction of chemicals

2.5. Understanding interaction of dyes, Chemicals and auxiliaries with textiles.

2.6. Identifying dyes, chemicals & auxiliaries' properties & functions

LO3. Set up and load machine

3.1. Weighing and loading textile materials

3.2. Measuring & mixing dye

3.3. Checking dye worksheet

3.4. Loading precisely dyes, chemicals and auxiliaries

3.5. Reporting non-conforming materials.

LO4. Operate and monitor dyeing machine

4.1. Operating dyeing machine

4.2. Monitoring dyeing operations

4.3. Identifying, correcting and reporting major and minor faults

LO5. Complete dyeing operations

5.1. Unloading textile materials

5.2. Dispatching Product

5.3. Production records and documentation

LO6. Check dye outcomes

6.1. Understanding quality of dyed textile materials

6.2. Assessing dyed textile materials

6.3. Rectifying dyeing faults

Learning Methods:

- Lecture and Discussion
- Demonstration
- Simulation
- Role playing

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

ASSESSMENT CRITERIA:

LO1. Determine job requirements

- Follow standard operating procedures (SOPs).
- Comply with work health and safety (WHS) requirements at all times.
- Use appropriate personal protective equipment (PPE) in accordance with SOPs.
- Identify job requirements from specifications, drawings, job sheets or work instructions.

LO2. Understand Dyeing processes

- Understand dyeing processes, technologies, environmental effects and its significance.
- Interaction of Dyes, Chemical s & auxiliaries with each other & textiles are understood
- Properties & functions of dyes, Chemicals & auxiliaries used are identified

LO3. Set up and load machine

- Dye is mixed according to dye worksheet using correct measuring devices and personal protective equipment.
- Dye worksheet is checked and if required entered into the dyeing machine.
- Dyes, Chemicals and auxiliaries are precisely measured & loaded into the dosing tank or machine according to work health and safety (WHS) requirements.
- Fibers, Yarns or fabrics is weighed and loaded for dyeing according to specifications.
- Non-conforming materials are reported.
- Area around dye tank or machine is kept clean during setting and loading.

LO4. Operate and monitor dyeing machine

- Dyeing machine is started, operated and stopped according to manufacturer requirements.
- Dyeing operations are monitored to ensure conformance with dye worksheet.
- Tank or machine is cleaned when required.
- Minor faults are identified and corrected where necessary to meet specified product requirements and are reported.
- Major machine faults or incorrect dyeing are reported.

LO5. Complete dyeing operations

- Fibers, Yarns or fabric is unloaded.
- Product is dispatched to next process.
- Cleaning of area is completed to ensure work environment is maintained in a safe and productive manner.

- Production records and other documentation are accurately completed.

LO6. Check dye outcomes

- Dyed yarns or fabrics quality is understood against quality standard.
- Yarn or fabric is assessed for faults and non-conformances.
- Yarn or fabric dyeing faults are rectified or reported.

Annex: Resource Requirements

IND TPT1 M06 0222 : Performing dyeing operations				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A. Learning Materials				
1.	TTLM	Containing learning guide, teachers guide and Assessment Packet	1pcs	1:25
2.	Reference Books			
2.1	Jose Cegarra and Punte, Dyeing of textile materials,	Textile, 1993.	1pcs	1:25
2.2	John Shore, Cellulosic dyeing,	WHP, 1998.	1pcs	1:25
2.3	RB Chavan, Chemical processing of handloom fabrics	1999	1pcs	1:25
2.4	John Shore, Blends dyeing,	SDC, 1998.	1pcs	1:25
2.5	Alan Johnson, The theory of coloration of Textiles,	2nd edition SDC, 1989.	1pcs	1:25
2.6	Klaus Hunger, Industrial dyes: chemistry, properties and applications,	Wiley – VCH, 2003.	1pcs	1:25
2.7	C H Giles, A laboratory course in dyeing,	3rd edition SDC, 1983.	1pcs	1:25
2.8	ML Gulrajani, Chemical processing of silk,	1993	1pcs	1:25
2.9	A. D. Broadbent, Basic principles of textile coloration,	WH Pub., 2001	1pcs	1:25
B.	**Learning Facilities & Infrastructure**			
1.	Lecture rooms	7m*8m	1	1:25
3.	Library	30m*30m	1	1:25
4	Work shop	Standard size	1	1:25

5.	Store	Standard size	1	1:25
B. Consumable Materials				
1.	Yarn	Cotton, Wool, polyester, Nylon, Acrylic etc	1Kg	1:25
2	Fabrics	Knitted, Woven and Non-woven etc.	10 m	2:25
3	Dyes, chemicals and Auxiliaries			
4.	Salt	Hardness: 150mg-400mg/ l Packing wt: 50Kg Color: White Grade: Industrial Type: Dyeing	1Kg	1:25
5.	Direct dye	Form: powder Solubility: soluble in water Solid content: 90 – 95% Usage: textile industry	1Kg	1:25
6.	Reactive dye	Form: powder PH 1% solution: 7.85 Solubility: 90^{o} c- 50g/l Solid content: 90 – 95% Usage: wool, nylon, cotton	1Kg	1:25
7.	Sulphur dye	Form: powder PH 1% solution: 10-11 T^{o}- 30 - 90^{o} moisture: 6% max Solid content: 90 – 95% Purity: 95 – 98% Usage: textile dye stuffs	1Kg	1:25
8.	Soda ash	Form: powder PH 1% solution: $\geq 12.5 \pm 1$ Water solubility: easily dissolve in water Solubility: $\geq$ 87%	1Kg	1:25

		Stability: Anion Usage: textile dye stuffs		
C. Tools, equipment and machineries				
1.	Digital Weighing balance	Display type :(LCD) Capacity: 220 gm Pan size: 80mm, power supply: 12V Division: 0.0001g/0.1mg Wind glass	1 pcs	1:25
2.	Beaker	Capacity / Diameter / Height 50 ml / 4 cm / 6cm 100 ml / 5cm / 7cm 250 ml / 6cm / 10cm 500 ml / 8cm / 12cm	1 pcs	1:25
3.	Pipet	Material: polystyrene Length: 348mm Capacity: 5ml	5 pcs	1:5
4.	Titrator	Water content: 0.1- 500mg H_2O Concentration:10mg/l – 100%H_2O Volume: 10 ml burette, discharge +-0.015mL, Repeatability +-0.005mL. Endpoint Detection: by polarized potential level detected with a twin platinum electrode.	1 pcs	1:25
5.	Spoon	Laboratory Spoon Spatula 150mm, stainless steel	5 pcs	1:5
6.	Thermometer	For kinematic viscosity Temperature range: 28.6 - 31.4℃ Length: 300 - 310mm Scale: 0.05℃ Immersion: Total immersion	5 pcs	1:5

		Material: Glass, mercury		
7.	PH meter	Characteristics: value pH range: 0 to 14 pH pH Resolution: 0.01 pH pH Accuracy: 0.02pH T^O Range: -5.0 – 60.0 ^OC Response time: <=1minute	5pcs	1:5
8.	Sample dyeing machines	Cooling : Air force Cooling Heating: Through Infra red Radiation M/C type: Automatic Automation: Micr oprocessor controller DC4F/R (DC10 F/R) Available Beaker capacity: 75ml, 100ml, 150ml, 200ml, 250ml, 500ml,100ml, 6000ml,10000ml	1pcs	1:25
9.	yarn dyeing machine	Material: Stainless steel Capacity: 30kg – 1000kg Usage: yarn dyeing M/C type: Automatic Shape: Round	1 pcs	1:25
10	Washing & squeezing machine	Capacity: 200kg – 500kg High temp up to 140^OC Working presser: 4kg/cm2 A Direct Steam heat M/C type: Automatic & semi automatic	1 pcs	1:25
11.	Drying machine	Dryer type: electric dryer Frequency: 50/60 Hz Phase: single phase Voltage: 220 – 440V Automation Grade: Automatic	1 pcs	1:25

LEARNING MODULE 07
TVET-PROGRAMME TITLE: **Textile Processing Technology Level I**
MODULE TITLE: **Performing Printing Operations**
MODULE CODE: **IND TPT1 M07 0222**
NOMINAL DURATION: **120** Hours
MODULE DESCRIPTION: This module covers the knowledge, attitudes and skills to operate different printing machines and equipment to produce printed textiles and garments.

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1. Determine job requirements

LO2. Understand Printing processes

LO3. Set up and load machine

LO4. Operate and monitor printing machine

LO5. Complete printing operations

MODULE CONTENTS:

LO1. Determine job requirements

1.1 Standard operating procedures (SOPs)

1.2 Complying with work health and safety (WHS) requirements

1.2.1 Hazard identification and control

1.2.2 Risk assessment and implementation

1.2.3 Risk reduction measures

1.3 Using appropriate personal protective equipment (PPE)

1.4 Identifying job requirements

LO2. Understand Printing processes

2.1 Understanding printing processes technologies

2.2 Interaction of Chemicals, auxiliaries, pigments and dyes

2.3 Properties & functions of pigments, dyes, Chemical & auxiliaries

LO3. Set up and loading machine

3.1 Checking and loading printing paste and screen

3.2 Making the machine ready for printing.

LO4. Operate and monitor printing machine

4.1 Operating printing machine

4.2 Monitoring printing operations 4.3 Identifying, correcting and reporting major and minor faults **LO5. Complete printing operations** 5.1 Unloading and dispatching printed product 5.2 Completing production records

Learning Methods:
▪ Lecture and Discussion ▪ Demonstration ▪ Simulation ▪ Role playing
Assessment Methods:
▪ Written test ▪ Oral questioning ▪ Practical demonstration

ASSESSMENT CRITERIA:

LO1. Determine job requirements

- Follow standard operating procedures (SOPs)
- Comply with work health and safety (WHS) requirements at all times
- Use appropriate personal protective equipment (PPE) in accordance with SOPs
- Identify job requirements from specifications, drawings, job sheets or work instructions

LO2. Understand Printing processes

- Understand printing processes, technologies and its significance.
- Interaction of Chemicals, auxiliaries, pigments or dyes with each other & textiles are understood.
- Properties & functions of pigments, dyes, Chemical & auxiliaries used are identified

LO3. Set up and load machine

- Clean the work area
- Receive and check the prepared printing paste according to printing worksheet.
- Check and receive the prepared screen according to design and required number.
- Load the screen on the printing machine by maintaining the correct register.
- Load the leading cloth attached to the fabric to be printed on the printing machine.
- Connect the printing paste with the printing machine by referring the sample and the screen design.
- Make the machine ready for printing.

LO4. Operate and monitor printing machine

- Printing machine is started, operated and stopped according to manufacturer requirements.
- Printing operations are monitored to ensure conformance with printing worksheet.
- Minor faults are identified and corrected where necessary to meet specified requirements and are reported.
- Major machine faults or incorrect printing are reported.

LO5. Complete printing operations

- Printed fabric or garment is unloaded.
- Product is dispatched to next process.
- Cleaning of area is completed to ensure work environment is maintained in a safe and productive manner.
- Production records and other documentation are accurately completed

Annex: Resource Requirements

IND TPT2 05 0222: Performing Printing Operations				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	**Learning Materials**			
1.	TTLM	Containing learning guide, teachers guide and Assessment Packet	1 pcs	1:25
2.	Reference Books			
2.1	Textile Printing Technology Revised Second Edition	Leslie W C Miles	5 pcs	1:5
2.2	Introduction to. Textile Printing	W.Clarke, B.Sc.Tech., A.M.CT.	5 pcs	1:5
B.	**Learning Facilities & Infrastructure**			
1.	Lecture rooms with full facilities	7m*8m	1 pcs	1:25
2.	Library	30m*30m	1 pcs	1:25
C.	**Consumable Materials**			
1.	Paper	A4	1 Dusta	1:25
2	Fabrics	Knitted, Woven and Non-woven etc.	10 m	2:25
3	Marker	Non-permanent white board marker	1pack	1:25
4	Printing paste ingredients	• Dyestuffs and Pigments.	1kg	1:25
		• Thickener.	1kg	1:25
		• Acid or alkali or acid liberating agents.	1kg	1:25
		• Carrier or swelling agents.	1kg	1:25
		• Solvents or solution acids or dispersing agents or humectants.	1kg	1:25
		• Antifoaming agents or de-foaming agents.	1kg	1:25
		• Wetting agents	1kg	1:25
		• Catalyst or oxygen carrier.		

D.	**Tools and Equipment**			
1.	Lap top Computer	Hp 8 ram	1 pcs	1:25
2	Printing machine	• Contour Laser Cutter for Digital Printed Fabrics with Vision CCD Camera	1 pcs	1:25
		• CALCA 6 Color 6 Station Screen Printing Machine Press T-shirt Printer Carousel	1 pcs	1:25
		•4-color 1-station Silk screen printing machine T-shirt Press DIY Kit equipment	1 pcs	1:25
3	Lap top Computer	Hp 8 GB ram	1 pcs	1:25
4	Computer	▪ RAM Size: 12 GB ▪ Processor Speed: 2.93 GHz ▪ Features: Built-in Speakers ▪ Processor: Intel Xeon 8-Core ▪ Graphics Processing Type: Dedicated Graphics ▪ Operating System: Windows 10 Pro ▪ Connectivity: USB 2.0, Display Port ▪ Maximum RAM Capacity: 48 GB ▪ Hard Drive Capacity: 500 GB ▪ Max Turbo Frequency: 3.33 Ghz	1 pcs	1:25
5	LCD Projector	▪ Compatible Operating System: Android and Windows operating systems ▪ Native Resolution:	1 pcs	1:25

		1920x1080 ▪ Resolution: 1080p ▪ Display Technology: LED ▪ Contrast Ratio: 100000:1 ▪ Aspect Ratio: 16:9 ▪ Features: Built-in Speakers ▪ Image Brightness: 600 ANSI Lumens ▪ Connections: USB ▪ Dimension: 170 x 170 x 49 mm		

LEARNING MODULE 08
TVET-PROGRAMME TITLE: **Textile Processing Technology Level I**
MODULE TITLE: **Performing final finishing operations**
MODULE CODE: **IND TPT1 M08 0222**
NOMINAL DURATION: **110** Hours
MODULE DESCRIPTION: This module covers the skills and knowledge to conduct final finishing operations using appropriate machines to deliver finished textile products

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1. Determine job requirements

LO2. Understand Finishing processes

LO3. Set up and load finishing machine or equipment

LO4. Operate and monitor finishing machines or equipment

LO5. Remove product and dispatch

LO6. Complete records

MODULE CONTENTS:

LO1. Determine job requirements

1.5. Following standard operating procedures (SOPs)

1.6. Complying with work health and safety (WHS) requirements

1.6.1. Hazard identification and control

1.6.2. Risk assessment and implementation

1.6.3. Risk reduction measures

1.7.Identifying job requirements

LO2. Understand finishing processes

2.1 Understanding finishing processes technologies

2.2 Understanding interaction of chemicals & auxiliaries

2.3 Identifying properties and functions of chemicals, and auxiliaries

2.4 Types of mechanical finishes

LO3. Set up and load finishing machine

3.1 Confirming textile product finishing processes

3.2 Checking textile product quality

3.3 Reporting non-conforming materials

3.4 Loading textile product

LO4.Operate and monitor finishing machines

4.1 Undertaking finishing process operations

4.2 Monitoring & identifying Processes, products and faults

4.3 Identifying, correcting and reporting minor and major product process and machine faults

LO5. Remove product and dispatch

5.1 Unloading product from finishing area

5.2 Dispatching Product

5.3 Completing cleaning of area

LO6. Complete records

6.1 Completing production records and other documentation

Learning Methods:

- Lecture and Discussion
- Demonstration
- Simulation
- Role playing

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

ASSESSMENT CRITERIA:

LO1. Determine job requirements

- Follow standard operating procedures (SOPs)
- Comply with work health and safety (WHS) requirements at all times
- Use appropriate personal protective equipment (PPE) in accordance with SOPs
- Identify job requirements from specifications, drawings, job sheets or work instructions

LO2.Understand Finishing processes

- Understand finishing processes, technologies and its significance.
- Interaction of Chemical s & auxiliaries with each other and textiles are understood.
- Properties & functions of Chemicals, auxiliaries and types of mechanical finishes used are identified.

LO3. Set up and load finishing machine or equipment

- Finishing processes required for textile product are confirmed.
- Textile product is checked for quality and conformity to specifications.
- Non-conforming materials are reported.
- Textile product is loaded into finishing machine or prepared for final finishing.

LO4. Operate and monitor finishing machines or equipment

- Finishing process operations are undertaken according to workplace and work health and safety (WHS) requirements.
- Processes, products and faults are monitored & identified to ensure product specifications and quality standards are achieved.
- Minor product process and machine faults are identified and corrected where necessary to meet specified requirements and are reported.
- Major machine or product faults are reported.

LO5. Remove product and dispatch

- Product is unloaded or removed from finishing area according to specifications.
- Product is dispatched.
- Cleaning of area is completed to ensure work environment is maintained in a safe and productive manner

LO6. Complete records

- Production records and other documentation are accurately completed.

Annex: Resource Requirements

IND TPT1 M08 0222: Performing final finishing operations				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	**Learning Materials**			
1.	TTLM	Containing: Learning guide, teachers guide and Assessment Packet	1pc	1:25
2	References	Chemistry & Technology of Fabric Preparation & Finishing by Dr. Charles Tomasino	5pcs	1:5
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	Area- 7m*8m	1pc	1:25
2.	Library	Area- 30mX30m	1pc	1:25
C.	**Consumable Materials**			
1.	Paper	A4	1dusta	1:25
2.	Marker	Non-permanent white board marker	2pcs	2:25
3.	Water proof chemicals	▪ Classification: Chemical Auxiliary Agent ▪ Type: Adsorbent ▪ Usage: Coating Auxiliary Agents, Leather Auxiliary Agents, Textile Auxiliary Agents	5L	1:5
4.	Fire retardant chemicals (Ammonium Polyphosphate)	▪ Phosphorus: 31%-32% ▪ Nitrogen: 14%-15% ▪ Water: <0.5% ▪ PH: 5.5 – 7.5 ▪ State: solid powder form	5kg	1:5
5.	Anti-microbial chemicals (Chlorhexidine gluconate)	▪ Purity: ≥20.0% ▪ Appearance: colorless or light yellow transparent and slightly sticky liquid ▪ Odor: odorless or almost odorless	5L	1:5

		▪ Relative density: 1.060 ～ 1.070g / ml (25 ℃) ▪ pH Value（5%）: 5.5-7.0 ▪ soluble: miscible with water and soluble in ethanol or acetone		
6.	Fabric	Any knitted or woven fabrics	75m	5:1
D.	**Tools and Equipments**			
1.	Digital weighing balance	320g 0.1mg precision electronic analytical balance	1pc	1:25
2.	Spoon	Laboratory Spoon Spatula 150mm, stainless steel	5pcs	1:5
3.	Thermometer	▪ For kinematic viscosity ▪ Temperature range: 28.6 - 31.4℃ ▪ Length: 300 - 310mm ▪ Scale: 0.05℃ ▪ Immersion: Total immersion ▪ Material: Glass, mercury	5pcs	1:5
4.	Beakers	▪ Material: borosilicate glass-1 ▪ Heat resistance: 250 ° C ▪ Capacity: 10 L ▪ Body outer diameter: φ 230 mm ▪ overall height: 360 mm ▪ One scale: about 1000 mL	5 pcs	1:5
5.	Computer	▪ RAM Size: 12 GB ▪ Processor Speed: 2.93 GHz ▪ Features: Built-in Speakers ▪ Processor: Intel Xeon 8-Core ▪ Graphics Processing Type: Dedicated Graphics ▪ Operating System: Windows 10 Pro ▪ Connectivity: USB 2.0, Display Port ▪ Maximum RAM Capacity: 48 GB ▪ Hard Drive Capacity: 500 GB ▪ Max Turbo Frequency: 3.33 Ghz	1 pcs	1:25
6	LCD Projector	▪ Android and Windows operating systems ▪ Native Resolution: 1920x1080 ▪ Resolution: 1080p	1pcs	1:25

		▪ Display Technology: LED ▪ Contrast Ratio: 100000:1 ▪ Aspect Ratio: 16:9 ▪ Features: Built-in Speakers ▪ Image Brightness: 600 ANSI Lumens ▪ Connections: USB ▪ Dimension: 170 x 170 x 49 mm		

Acknowledgements

The **Ministry of Labor and Skills** wishes to thank and appreciation for the trainers who donated their effort and time to develop this outcome based curriculum for the TVET Program **Textile processing Technology Level I**.

We also thank all regional Labor and Skill/TVET Bureaus, Ministry of labor and skills coordinators, all instructors who developed this curriculum for active facilitation of this curriculum development.

The trainers who developed the curriculum

No	Name	Qualification	Educational background	Region	College	Mobile number	E-mail
1	Tahir Abiyo	Masters	MSc in Textile Technology	Oromia	Athlete Kenenisa Polytechnic college	0910605550	tahirdiba95@gmail.com
2	Tambizot Getachew	Masters	MSc in fibres and textile processing technology	Addis Ababa	ETIDI	0936694972	tambizotgetachew10@gmail.com
3	Robel Legese	Masters	MSc in Textile Chemistry	Addis Ababa	ETU	0910447294	robellegese1@gmail.com
4	Samuel Mohammed	Degree	Bed Textile Technology	Addis Ababa	General Wingate Polytechnic College	0910694912	samuealmoha2095@gmail.com
5	Asfaw Azene	Masters	MSc in Textile Technology	Amhara	D/berhan Polytechnic college	0913852831	azeneasfaw2008@gmail.com
6	Abreham Wenchemo	Degree	Banking and Insurance	Hawassa	South TVET	0910066725	menchbet@gmail.com