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MINISTRY OF LABOR AND SKILLS

TEXTILE PROCESSING TECHNOLOGY

LEVEL – IV

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 IV**.**

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

TVET-Program Design

1.1. TVET-Program Title: Textile Processing Technology **Level IV**

1.2. 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 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_Understand and apply textile processing, Prepare standard dye recipe for textile, Supervise Operations in Textile processing units, Interpret and Apply Textile processing Calculations and Specifications, Apply Quality Systems and Statistical Quality Control, Set-Up of textile processing Machines for Product Change, Estimate Cost Job, Plan and Organize textile processing operations, Develop of New finished Textile Product in accordance with the performance criteria and evidence guide described in the OS.

1.3. TVET-Program Training Outcomes

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

IND TPT4 01 1221 Understand and apply textile processing

IND TPT4 02 1221 Prepare standard dye recipe for textile

IND TPT4 03 1221 Supervise Operations in Textile processing units

IND TPT4 04 1221 Interpret and Apply Textile processing Calculations and Specifications

IND TPT4 05 1221 Apply Quality Systems and Statistical Quality Control

IND TPT4 06 1221 Set-Up of textile processing Machines for Product Change

IND TPT4 07 1221 Estimate Cost Job

IND TPT4 08 1221 Plan and Organize textile processing operations

IND TPT4 09 1221 Develop of New finished Textile Product

1.4. Duration of the TVET-Program

The Program will have duration of **648 *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.	Understand and apply textile processing	36	15	15	**66**	
2.	Prepare standard dye recipe for textile	32	20	30	**82**	
3.	Supervise Operations in Textile processing units	30	-	20	**50**	
4.	Interpret and Apply Textile processing Calculations and Specifications	40	40	-	**80**	
5.	Apply Quality Systems and Statistical Quality Control	80	20	-	**100**	
6.	Set-Up of textile processing Machines for Product Change	50	30		**80**	
7.	Estimate Cost Job	15	10	25	**50**	
8.	Plan and Organize textile processing operations	20	10	30	**60**	
9.	Develop of New finished Textile Product	20	15	45	**80**	
	Total	323	125	100	**648**	

1.5. 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 IV**.**

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.

1.6. Target Groups

Any citizen **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 TPT4 01 1221	Understand and apply textile processing	**IND TPT4 M01 0222**	Understanding and apply textile processing science	▪ Identify the physical and chemical properties of textiles materials ▪ Determine effects of textile processes	66
IND TPT4 02 1221	Prepare standard dye recipe for textile	**IND TPT4 M02 0222**	Preparing standard dye recipe for textile processing production	▪ Identify properties of textile ▪ Perform preliminary selection and evaluation of dyes, chemicals and auxiliaries ▪ Perform final selection and evaluation of dyes, chemicals, specifications and recipes ▪ Prepare final dyes and chemicals specifications and their recipes	82
IND TPT4 03 1221	Supervise Operations in Textile processing units	**IND TPT4 M03 0222**	Supervising Operations in Textile processing units	▪ Identify scope of supervision responsibility ▪ Provide technical support to operators ▪ Control production to achieve efficiency targets ▪ Supervise team activity	50

				▪ Liaise with downstream and upstream areas and management ▪ Ensure workplace documentation	
IND TPT4 04 1221	Interpret and Apply Textile processing Calculations and Specifications	**IND TPT4 M04 0222**	Interpreting and Apply Textile processing Calculations and Specifications	▪ Obtain and interpret textile specifications ▪ Perform textile processing calculations ▪ Complete records	80
IND TPT4 05 1221	Apply Quality Systems and Statistical Quality Control	**IND TPT4 M05 0222**	Applying Quality Systems and Statistical Quality Control	▪ Establish quality specifications for product ▪ Ensure work within a quality system ▪ Engage in quality improvement ▪ Take samples ▪ Apply statistical process to monitor production	100
IND TPT4 06 1221	Set-Up of textile processing Machines for Product Change	**IND TPT4 M06 0222**	Setting-Up of textile processing Machines for Product Change	▪ Determine job requirements ▪ Set machines ▪ Conduct sample runs ▪ Re-adjust machine settings to meet requirements ▪ Maintain records	80

IND TPT4 07 1221	Estimate Cost Job	**IND TPT4 M07 0222**	Estimating Cost Job	▪ Gather information ▪ Estimate materials, labor and time ▪ Calculate costs ▪ Document details	50
IND TPT4 08 1221	Plan and Organize textile processing operations	**IND TPT4 M08 0222**	Planning and Organize textile processing operations	▪ Set objectives ▪ Plan and schedule work activities ▪ Implement work plans ▪ Monitor work activities ▪ Review and evaluate work plan and activities	60
IND TPT4 09 1221	Develop of New finished Textile Product	**IND TPT4 M09 0222**	Developing of New finished Textile Product	▪ Confirm design of new product ▪ Determine material requirements for product ▪ Determine process requirements for product ▪ Ensure process needs for new product have been met ▪ Trial new product through the process ▪ Determine process capability ▪ Coordinate product trials ▪ Implement standard procedures for new product	80

*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 A - Level and who have satisfactory practical experiences or equivalent qualifications.

LEARNING MODULE 01
TVET-PROGRAMME TITLE: **Textile Processing Technology Level IV**
MODULE TITLE : Understanding and applying textile processing science
MODULE CODE : **IND TPT4 M01 0222**
NOMINAL DURATION : **66 Hours**
MODULE DESCRIPTION : This module covers the understanding and knowledge required to use and apply knowledge of the physical and chemical properties of textiles in processing applications.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Identify the physical and chemical properties of textiles materials **LO2.** Determine effects of textile processes
MODULE CONTENTS: **LO1. Identify the physical and chemical properties of textiles materials** 1.1 Identifying textile material & their specification 1.2 Appropriate personnel in textile material identification 1.3 Identifying textile material's physical properties 1.4 Identifying textile's material chemical properties 1.5 Undertaking standard physical and chemical tests **LO2. Determine effects of textile processes** 2.1 Characteristics and effect of physical properties on textiles 2.2 Characteristics and effect of chemical properties on textiles 2.3 Identifying textile material processing effects 2.3.1 Pretreatment processes 2.3.2 Dyeing 2.3.3 Special treatment or finishing 2.3.4 Printing 2.4 Determining textile processing impact on the physical and chemical properties 2.5 Undertaking standard textile processing tests

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

ASSESSMENT CRITERIA:

LO1. Identify the physical and chemical properties of textiles materials

- The textile material is identified using specifications, work sheets or documentation
- Unknown textile material is referred to appropriate personnel for identification
- The physical properties of the textile material are identified using product specifications, work sheets or documentation and research techniques
- The chemical properties of the textiles or textile material are identified using product specifications, work sheets or documentation and research techniques
- Where required, standard tests are undertaken according to OHS practices to establish or validate physical and chemical properties

LO2. Determine effects of textile processes

- The characteristics and effect of physical properties on textiles are identified
- The characteristics and effect of chemical properties on textiles are identified
- The effects of textile processing on textile materials are identified
- The behaviour or impact of textile processing on the physical and chemical properties of textile materials is determined
- Where required, standard tests are undertaken to establish or validate effects of textile processing

Annex: Resource Requirements

IND TPT4 M01 0222: Understanding and applying textile processing science				
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
2	References			
2.1	Dyeing and chemical technology of textile fibres	E. R. TROTMAN M.B.E., Ph.D. -*FOURTH EDITION*	5	1:5
2.2	Chemical technology in the pre- treatment processes of textile	S.R. KARMAKAR	5	1:5
2.3	Textile Printing	Edited by Leslie W C Miles Revised Second Edition	5	1:5
2.4	Chemistry & Technology of Fabric Preparation & Finishing	Dr. Charles Tomasino	5	1:5
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	Area- 7m*8m	1	1:25
2.	Library	Area- 30mX30m	1	1:25
C.	**Consumable Materials**			
1.	Paper	A4	1dusta	1:25
2	Marker	Non-permanent white board marker	2	2:25
D.	**Tools and Equipments**			
1.	Computer	- RAM Size: 12 GB - Processor Speed: 2.93 GHz	1	1:25

		- 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		
2.	LCD Projector	- 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	1:25

LEARNING MODULE 02
TVET-PROGRAMME TITLE: Textile Chemical Processing Technology **Level IV**
MODULE TITLE : Preparing standard dye recipe for textile processing production
MODULE CODE : **IND TPT4 M02 0222**
NOMINAL DURATION : 82 Hours
MODULE DESCRIPTION : This module covers the skills and knowledge associated with selecting dyes, chemical, auxiliaries and developing their recipe. Besides, there needs to be preparing necessary specifications.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Identify properties of textile **LO2.** Perform preliminary selection and evaluation of dyes, chemicals and auxiliaries **LO3**. Perform final selection and evaluation of dyes, chemicals, specifications and recipes **LO4.** Prepare final dyes and chemicals specifications and their recipes
MODULE CONTENTS: **LO1. Identify properties of textile** 1.1. Confirming textile material product specifications 1.2. Clarifying and determining finished product end use and performance standard 1.3. Analysing sample **LO2. Perform preliminary selection and evaluation of dyes, chemicals and auxiliaries** 2.1. Determining and undertaking dyes, chemicals and auxiliary's preliminary selection 2.2. Identifying expected textile production and reproduction processes 2.3. Trailing selection of dyes and chemicals, specification and recipes and evaluating results 2.4. Reviewing, re-developing and re-testing dye and chemicals selection and recipe 2.5. Seeking preliminary dye and chemicals specification approval **LO3. Perform final selection and evaluation of dyes, chemicals, specifications and recipes** 3.1. Selecting sampling and testing techniques 3.2. Implementing tests and analysing results 3.3. Reviewing, modifying and re-testing; dyes, chemicals and recipes 3.4. Checking dye and chemicals selection and approving colour specification 3.5. Applying environmental requirements and procedure

LO4. Prepare final dyes and chemicals specifications and their recipes

4.1. Testing bulk production samples

4.2. Analysing bulk results and reviewing, modifying, and re-tasting dyeing recipes

4.3. Developing, checking and filling dyes and chemicals specification and recipes

4.4. Monitoring dyes and chemicals specification and recipes

4.5. Preparing reports and documentation

Learning Methods:

- Lecture and Discussion
- Demonstration
- Simulation
- Role playing

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

ASSESSMENT CRITERIA:

LO1. Identify properties of textile

- Specifications and or sample of textile material product is confirmed with originator and client
- End use and performance standards expected of finished product are clarified and determined with appropriate personnel
- Sample is analysed to determine type and composition using appropriate techniques, if required

LO2. Perform preliminary selection and evaluation of dyes, chemicals and auxiliaries

- Preliminary selection of dyes, chemicals and auxiliaries is undertaken with reference to specifications and or previous product dyeing references
- Expected textile production and reproduction processes are identified based on preliminary dye selection and appropriate personnel advised
- Preliminary dye and chemical selection is determined for the sample of textile
- Dyes and chemicals selections, specification and recipes are trailed using laboratory-based production facilities and results evaluated against requirements of originator and client, as required
- Dye and chemicals selection and recipe is reviewed, re-developed and re-tested as required
- Approval of preliminary dye and chemicals specification by originator and client is sought prior to implementing limited production run

LO3. Perform final selection and evaluation of dyes, chemicals, specifications and recipes

- Sampling and testing techniques are selected appropriate to evaluation of product during limited production run
- Tests are implemented using established enterprise procedures and quality standards
- Results are analysed and preliminary dye and chemicals selection and recipes reviewed, modified and re-tested as required
- Dye and chemicals selection checked against original client specifications, requirements, enterprise production process and requirements
- Approval of colour specification by originator and client is sought prior to implementing bulk production run
- Environmental requirements and procedures concerned with waste, pollution, storage

and recycling of materials are correctly applied at all stages of the process

LO4. Prepare final dyes and chemicals specifications and their recipes

- Samples from bulk production run are tested using appropriate techniques
- Results are analysed and dyeing recipes reviewed, modified and re-tested as required
- Dyes and chemicals specification and recipes are developed, checked and filed in accordance with workplace requirements and industry and quality standards
- Reports and documentation are prepared
- Dye and chemicals specification and recipe is monitored to ensure continuity and repeatability of colour and test results

Annex: Resource Requirements

IND TPT4 M02 0222: Preparing standard dye recipe for textile processing production				
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
2.	Reference Books			
2.1	Jose Cegarra and Punte, Dyeing of textile materials,	Textile, 1993.	1	1:25
2.2	John Shore, Cellulosic dyeing,	WHP, 1998.	1	1:25
2.3	RB Chavan, Chemical processing of handloom fabrics	1999	1	1:25
2.4	John Shore, Blends dyeing,	SDC, 1998.	1	1:25
2.5	Alan Johnson, The theory of coloration of Textiles,	2nd edition SDC, 1989.	1	1:25
2.6	Klaus Hunger, Industrial dyes: chemistry, properties and applications,	Wiley – VCH, 2003.	1	1:25
2.7	C H Giles, A laboratory course in dyeing,	3rd edition SDC, 1983.	1	1:25
2.8	ML Gulrajani, Chemical processing of	1993	1	1:25

	silk,			
2.9	A. D. Broadbent, Basic principles of textile coloration,	WH Pub., 2001	1	1:25
3	Journals			
3.1	A Step-by-Step Chemical Recipe to Dye Commercial Cotton with Natural Indigo Dyes in an Open Bath for the Beginners and Artisans.	Shuvo II (2018) J Textile Sci Eng 8: 336. doi: 10.4172/2165-8064.1000336		
3.2	A. D. Broadbent, Basic principles of textile coloration,	WH Pub, 2001	1	1:25
B. Learning Facilities & Infrastructure				
1.	Lecture rooms with full facilities	7m*8m	1	1:25
2.	Library	30m*30m	1	1:25
3	Work shop / laboratory	Textile procssing	1	1:25
C. 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	salt	Hardness: 150mg-400mg/ l Packing wt: 50Kg Color: White Grade: Industrial Type: Dyeing	1Kg	1:25
3.2	Direct dye	Form: powder	1Kg	1:25

		Solubility: soluble in water Solid content: 90 – 95% Usage: textile industry		
3.3	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
3.5	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
3.6	Soda ash	Form: powder PH 1% solution: $\geq 12.5 \pm 1$ Water solubility: easily dissolve in water Solubility: $\geq$ 87% Stability: Anion Usage: textile dye stuffs	1Kg	1:25
D. 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	1:25
2.	Beaker	Capacity / Diameter / Height 50 ml / 4 cm / 6cm 100 ml / 5cm / 7cm 250 ml / 6cm / 10cm	1	1:25

		500 ml	8cm	12cm		
3.	Pipet	Material: polystyrene Length: 348mm Capacity: 5ml			5	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	1:25
5.	Spoon	Laboratory Spoon Spatula 150mm, stainless steel			5	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	1:5
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				
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		
9.	yarn dyeing machine	Material: Stainless steel Capacity: 30kg – 1000kg Usage: yarn dyeing M/C type: Automatic Shape: Round	1	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	1	1:25
11.	Drying machine	Dryer type: electric dryer Frequency: 50/60 Hz Phase: single phase Voltage: 220 – 440V Automation Grade: Automatic	1	1:25

LEARNING MODULE 03
TVET-PROGRAMME TITLE: Textile Chemical Processing Technology **Level IV**
MODULE TITLE : Supervising operations in textile processing units
MODULE CODE : **IND TPT4 M03 0222**
NOMINAL DURATION : **50 Hours**
MODULE DESCRIPTION : This unit covers the knowledge, skills and attitudes to supervise operations within textile processing units.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Identify scope of supervision responsibility **LO2.** Provide technical support to operators **LO3**. Control production to achieve efficiency targets **LO4.** Supervise team activity **LO5.** Liaise with downstream and upstream areas and management **LO6.** Ensure workplace documentation
MODULE CONTENTS: **LO1. Identify scope of supervision responsibility** 1.1. Identifying machine operations, staff, resources and operation processes 1.2. Identifying supervisory role, scope and limitations 1.3. Determining production targets 1.4. Identifying maintenance requirements **LO2. Provide technical support to operators** 2.1. Identifying operator roles and personnel allocation 2.2. Monitoring operator productivity and ability 2.3. Identifying and communicating training needs 2.4. Addressing technical problems 2.5. Providing technical support **LO3. Control production to achieve efficiency targets** 3.1. Setting and interpreting production standards 3.2. Recommending and implementing corrective or preventative action 3.3. Communicating targets and procedures

3.4. Managing and ensuring resources supply

3.5. Scheduling and monitoring machinery maintenance

LO4. Supervise team activity

4.1. Communicating production standards

4.2. Monitoring and addressing work allocation requirements

4.3. Communicating targets and procedures

4.4. Monitoring and supporting team communications and relations

4.5. Monitoring team compliance with WHS practices

4.6. Monitoring production output

LO5. Liaise with downstream and upstream areas and management

5.1 Maintaining downstream and upstream liaison

5.2 Maintaining proper work or process progress information flow

5.3 Discussing and arranging down time minimizing opportunities

LO6. Ensure workplace documentation

6.1. Identifying documentation procedures

6.2. Monitoring movement of materials

6.3. Monitoring compliance and completing documentation textile process units

Learning Methods:

- Lecture and Discussion
- Demonstration
- Simulation
- Role playing

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

ASSESSMENT CRITERIA:

LO1. Identify scope of supervision responsibility

- Machine operations, staff, resources and operation processes within work area are identified.
- Scope and limitations of supervisory role are identified.
- Production targets are determined.
- Maintenance requirements are identified.

LO2. Provide technical support to operators

- Operator roles and allocation of personnel are identified
- Operator productivity and ability to conduct work effectively and safely are monitored.
- Training needs are identified and communicated to appropriate personnel.
- Technical problems rose by operators regarding machinery, product quality, and operational safety are addressed
- Technical support in the skill and knowledge associated with operations is provided to operators.

LO3. Control production to achieve efficiency targets

- Production standards are set or interpreted to meet production targets.
- Corrective or preventative action is recommended and implemented.
- Targets and procedures are communicated to relevant personnel in a logical and easily understood manner.
- Supply of resources is managed and ensured as required.
- Maintenance of machinery is scheduled and monitored.

LO4. Supervise team activity

- Production standards are communicated to team members.
- Work allocation requirements are monitored and addressed in order to maintain optimum production efficiency.
- Targets and procedures are communicated to appropriate personnel in a logical and easily understood manner.
- Team communications and relations are monitored and supported.
- Team compliance with WHS practices is monitored.
- Production output is monitored against targets and addressed as necessary

LO5. Liaise with downstream and upstream areas and management

- Liaison with downstream and upstream areas is maintained to ensure quality and efficiency of operations as required.
- Management is kept informed of progress and any issues which may affect operation outcomes.
- Ongoing liaison is maintained with management to guide operation targets.
- Opportunities to minimize down time are discussed and arranged with maintenance staff and management.

LO6. Ensure workplace documentation

- Documentation procedures are identified for each step of operations.
- Compliance with documentation requirements is monitored.
- Movement of materials through operations is monitored to assess progress.
- Textile process units documentation is completed.

Annex: Resource Requirements

IND TPT4 M03 0222: Supervising Operations in Textile processing units				
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
2.	Reference Books			
2.1			1	1:25
3.	Journals/Publication/Magazines			
3.1	Production Systems: Planning, Analysis & Control :	By — Riggs, J.L.(4th Edn.) John Wiley & Sons 2.		
3.2	Modern Production/Operation management:.	By — Buffa, E.S. & Sarin, =,.K.(8`" Edn.) John Wiley & Sons. 3		
3.3	Production & Operations management :	By Panneer saivem, R.(2' 1 Edn.) PHI 4.		
3.4	Production & Operations Management :	By Chary, S.N.(TMH)		
B.	**Learning Facilities & Infrastructure**			
1.	Lecture rooms with full facilities	7m*8m	1	1:25
2.	Library	30*30m^2	1	1:25

C.	**Consumable Materials**			
1.	Stationary items	A4 Paper,	1 pack	1:25
2	Marker	Non-permanent white board marker	2	2:25
D.	**Tools , equipment and machineries**			
1.	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	1:25
2.	LCD Projector	- 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	1:25

LEARNING MODULE 04
TVET-PROGRAMME TITLE: **Textile Processing Technology Level IV**
MODULE TITLE : Interpreting and applying textile processing calculations and specifications
MODULE CODE : **IND TPT4 M04 0222**
NOMINAL DURATION : 80 Hours
MODULE DESCRIPTION : This module covers the knowledge, skills and attitudes to interpret and apply calculations and specifications related to within a textile processing manufacturing process

LEARNING OUTCOMES

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

LO1. Obtain and interpret textile specifications

LO2. Perform textile processing calculations

LO3. Complete records

MODULE CONTENTS:

LO1. Obtain and interpret textile specifications

1.1. Identifying specifications documenting system features and specifications converting techniques

1.2. Interpreting textiles analysis specifications

1.3. Interpreting and applying textile processing terminology

1.4. Obtaining and interpreting textile processing operation specifications

1.5. Determining work requirements specifications

1.6. Undertaking specification clarification

LO2. Perform textile processing calculations

2.1. Determining specific production processes calculation requirements

2.2. Identifying and applying specification conversion formula

2.3. Identifying and applying processing production calculation formula

2.4. Checking and verifying textile processing calculations

2.5. Examining and validating outcome deviation

LO3. Complete records

3.1 Documenting calculation records

3.2 Preparing testing or production processes documentation

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

ASSESSMENT CRITERIA:

LO1. Obtain and interpret textile specifications

- Features of systems used to document specifications and techniques for converting specifications across systems are identified
- Specifications applying to textiles analysis are interpreted
- Terminology used in the textile processing production industry relating to raw materials, specifications and processing are correctly interpreted, applied and used
- Specifications appropriate to the textile processing operation are obtained and interpreted.
- Work requirements are determined from specifications
- Clarification of specifications is undertaken as required using appropriate information resources and search techniques

LO2. Perform textile processing calculations

- Calculation requirements for specific production processes are determined
- Formulas used to convert specifications to desired format are identified and applied
- Formulas used for calculating requirements textile processing production are identified and applied
- Textile processing Calculations are checked and verified as correct
- Deviations from expected outcomes are examined and validated with appropriate information resources

LO3. Complete records

- Calculation records are accurately documented to agreed standards
- Documentation is prepared for testing or production processes

Annex: Resource Requirements

IND TPT4 M04 0222 : Interpreting and applying textile processing calculations and specifications				
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
2	Journals/Publication/Magazines			
2.1	Textile wet processing laboratory manual	Prepared by: Gopalakrishna D & P.Vinayagamurthi	1	1:25
2.2	Laboratory calculations & procedures	By: Eng. Abu Syed M.Sc. in Textile engineering	1	1:25
B. Learning Facilities & Infrastructure				
1.	Lecture rooms with full facilities	8m*7m	1	1:25
2.	Library	30m*30m	1	1:25
3	Workshop (laboratory)	Textile processing	1	1:25
4	Demonstration site	Any textile processing unit/pilot plant	1	1:25
C. Consumable Materials				
1.	A4 paper	A4 :Size 70 gm	1	1:25

LEARNING MODULE 05
TVET-PROGRAMME TITLE: **Textile Processing Technology Level IV**
MODULE TITLE : Applying quality systems and statistical quality control
MODULE CODE : **IND TPT4 M05 0222**
NOMINAL DURATION : 100 Hours
MODULE DESCRIPTION : This module convers the knowledge, attitudes and skills required for working within a quality improvement system, either individually or in a team situation and taking samples or applying a statistical process to monitor textile processing production.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Establish quality specifications for product **LO2.** Ensure work within a quality system **LO3.** Engage in quality improvement **LO4.** Take samples **LO5.** Apply statistical process to monitor production
MODULE CONTENTS: **LO1. Establish quality specifications for product** 1.1. Sourcing market specifications and identifying legislating requirements 1.2. Developing and agreeing upon quality specifications 1.3. Introducing Documenting quality specifications 1.4. Updating quality specifications **LO2. Ensure work within a quality system** 2.1. Ensuring quality improvement system instructions and procedures 2.1.1. Quality assurance 2.1.2. Quality control 2.1.3. Quality inspection 2.1.4. Quality improvement 2.1.5. Total quality management system 2.2. Ensuring specifications conformance 2.3. Detecting and reporting defects 2.4. Monitoring operation, product or service quality performance **LO3. Engage in quality improvement**

3.1. Assessing current quality performance

3.2. Identifying established performance measures

3.3. Identifying specifications and standard operating procedures

3.4. Detecting and reporting defects

3.5. Participating in process improvement procedures

3.6. Communicating customer and supplier relationship improvement

LO4. Take samples

4.1.Understanding population and sample

4.2. Applying sampling schemes and taking sample

LO5. Apply statistical process to monitor production

5.1.Understanding variation concept

5.2. Using data to produce relevant statistical information

5.3. Interpreting data and presenting information

Learning Methods:

- Lecture and Discussion
- Demonstration
- Simulation
- Role playing

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

ASSESSMENT CRITERIA:

LO1. Establish quality specifications for product

- Market specifications are sourced and legislated requirements identified.
- Quality specifications are developed and agreed upon
- Quality specifications are documented and introduced to organization staff /personnel in accordance with the organization policy
- Quality specifications are updated when necessary

LO2. Ensure work within a quality system

- Instructions and procedures are ensured to be followed and duties performed in accordance with requirements of quality improvement system
- Conformance to specifications is ensured
- Defects are detected and reported according to standard operating procedures.
- Performance of operation or quality of product or service is monitored to ensure customer satisfaction

LO3. Engage in quality improvement

- Current performance is assessed
- Established performance measures are identified.
- Specifications and standard operating procedures are identified
- Defects are detected and reported according to standard operating procedures.
- Process improvement procedures are participated in
- The improvement of internal/external customer/supplier relationships is communicated
- Performance of operation or quality of product or service is monitored to ensure customer satisfaction

LO4. Take samples

- Difference between population and sample is understood and various sampling schemes are applied in accordance with standard operating procedures
- Sample is taken according to the procedure

LO5. Apply statistical process to monitor production

- Concept of variation in terms of average and spread is understood. Data is used to produce relevant statistical information.
- Data is interpreted accurately and information is presented to appropriate authority according to standard operating procedures

Annex: Resource Requirements

IND TPT4 M05 0222 : Applying quality systems and statistical quality control				
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
2	Journals/Publication/Magazines			
2.1	Quality control basics and systems	Published by: Mohamed Mahmoud Hashim; Mohamed Salah Hamed and Moemen Negm El Den	1	1:25
2.2	Testing and statistical quality control in textile manufacturing	Indian Institute of Technology Delhi, India	1	1:25
B. Learning Facilities & Infrastructure				
1.	Lecture rooms with full facilities	8m*7m	1	1:25
2.	Library	30m*30m	1	1:25
3	Workshop (laboratory)	Textile processing	1	1:25
4	Demonstration site	Any textile processing unit/pilot plant	1	1:25
C. Consumable Materials				
1.	A4 paper	A4 :Size 70 gm	1	1:25

LEARNING MODULE 06
TVET-PROGRAMME TITLE: **Textile Processing Technology Level IV**
MODULE TITLE : Setting-up of textile processing machines for product change
MODULE CODE : **IND TPT4 M06 0222**
NOMINAL DURATION : 80 Hours
MODULE DESCRIPTION : This module covers the skills, attitudes and knowledge required to set up machines for production change in a textile processing units.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Determine job requirements **LO2.** Set machines **LO3.** Conduct sample runs **LO4.** Re-adjust machine settings to meet requirements **LO5.** Maintain records
MODULE CONTENTS: **LO1. Determine job requirements** 1.1. Standard operating procedures (SOPs) 1.2. Personal protective equipment (PPE) 1.3. Identify job requirements **LO2. Set machines** 2.1. Interpreting product specifications 2.2. Setting machine **LO3. Conduct sample runs** 3.1. Obtaining sampling materials 3.2. Operating machine 3.3. Organizing and testing sample **LO4. Re-adjust machine settings to meet requirements** 4.1. Interpreting test results 4.2. Assessing adjustment changes 4.3. Informing production personnel **LO5. Maintain records** 5.1. Maintaining and updating records

5.2. Preparing reports and accomplishing 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, drawing job sheets or work instructions

LO2. Set machines

- Product specifications are interpreted correctly in relation to machine setting requirements
- Machine is set in accordance with product specifications, machine manufacturer instructions and WHS practices

LO3. Conduct sample runs

- Material to be used for sampling is obtained
- Machine is operated in accordance with manufacturer and workplace instructions to produce a specified sample
- Sample is organized for quality testing
- Sample is tested in accordance with workplace practices to ensure required quality standards are met

LO4. Re-adjust machine settings to meet requirements

- Test results are interpreted to determine adjustment requirements
- Adjustment changes are assessed in accordance with product and machine specifications
- Appropriate production personnel are informed of the availability of the newly set up machine in accordance with workplace practices

LO5. Maintain records

- Records are maintained and updated
- Reports prepared, where necessary, in accordance with workplace practices
- Necessary documentation is accomplished in accordance with workplace procedures and standards

Annex: Resource Requirements

IND TPT4 M06 0222: Setting-up of textile processing machines for product change				
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
2	Journals/Publication/Magazines			
2.1	Developing a standard pre-setup procedure for machines	Aswin Ravikumar & Shreyank Ramalingaiah; November 2018	1	1:25
2.2	An optimum procedure for setting machines or adjusting processes	FRANK E. GRUBBS Ballistic Research Laboratories, Aberdeen Proving Ground, Md	1	1:25
B. Learning Facilities & Infrastructure				
1.	Lecture rooms with full facilities	8m*7m	1	1:25
2.	Library	30m*30m	1	1:25
3	Workshop (laboratory)	Textile processing	1	1:25
C. Consumable Materials				
1.	A4 paper	A4 :Size 70 gm	1	1:25
D. Tools and Equipment				
1.	Machine setting manuals and kits	According to specific txtile processing machine	1	1:25

LEARNING MODULE 07
TVET-PROGRAMME TITLE: **Textile Processing Technology Level IV**
MODULE TITLE : **Estimating cost Job**
MODULE CODE : **IND TPT4 M07 0222**
NOMINAL DURATION : **50** Hours
MODULE DESCRIPTION : This module covers the skills and knowledge to estimate materials, labor, and time requirements and establish costs for textile processing products as well as services.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Gather information **LO2.** Estimate materials, labor and time **LO3.** Calculate costs **LO4.** Document details
MODULE CONTENTS: **LO1. Gathering information** 1.1. Obtaining customer requirements details 1.2. Developing and recording products and services details 1.3. Determining delivery point and transportation methods **LO2. Estimate materials, labour and time** 2.1. Estimating material types and quantities 2.2. Estimating service labor and time requirements **LO3. Calculate costs** 3.1 Calculating total materials and labor costs 3.2 Calculating total job cost 3.3 Calculating customer final cost **LO4. Document details** 4.1 Documenting future reference details

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

ASSESSMENT CRITERIA:

LO1. Gather information

- Details of customer requirements are obtained through discussion with customer or from information supplied.
- Details of products and services to be provided are developed.
- Delivery point and methods of transportation are determined where necessary.
- Details are recorded.

LO2. Estimate materials, labor and time

- Types and quantities of materials required for work are estimated.
- Labor requirements to perform required services are estimated.
- Time requirements to perform required services are estimated.

LO3. Calculate costs

- Total materials costs and labor costs are calculated.
- Total job cost is calculated, including overheads and mark-up percentages.
- Final cost to customer is calculated.

LO4. Document details

- Details are documented for future reference

Annex: Resource Requirements

IND TPT4 M07 0222: Estimating cost Job				
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
2	Reference book			
2.1	Textile Chemical Processin Students Handbook	Shiksha Kendra, 2014 first edition	5	1:5
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	Area- 7*8m^2	1	1:25
2.	Library	Area- 30X30m^2	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**			
1	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	1	1:25

		Port ▪ Maximum RAM Capacity: 48 GB ▪ Hard Drive Capacity: 500 GB ▪ Max Turbo Frequency: 3.33 Ghz		
2.	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	1:25

LEARNING MODULE 08
TVET-PROGRAMME TITLE: **Textile Processing Technology Level IV**
MODULE TITLE : **Planning and Organizing textile processing operations**
MODULE CODE : **IND TPT4 M08 0222**
NOMINAL DURATION : 60 Hours
MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required in planning and organizing work activities in a textile processing production application. It may be applied to from small to big textile processing units
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Set objectives **LO2.** Plan and schedule work activities **LO3.** Implement work plans **LO4.** Monitor work activities **LO5.** Review and evaluate work plan and activities
MODULE CONTENTS: **LO1. Set objectives** 1.1. Planning organizational objectives 1.2. Stating objectives measurable and achievable 1.3. Reflecting team member's support and commitment 1.4. Identifying realistic and attainable objectives **LO2. Plan and schedule work activities** 2.1. Identifying, prioritizing and scheduling task activities 2.2.Assigning work activities and allocating resources 2.3. Coordinating schedule **LO3. Implement work plans** 3.1. Identifying work methods and practices 3.2. Implementing work plans **LO4. Monitor work activities** 4.1. Monitoring and comparing work activities 4.2. Monitoring work performance 4.3. Coordinating recommendation and reporting work activities deviation

4.4. Compiling requirement reports

4.5. Observing report timeliness

4.6. Establishing and maintaining SOPs files

LO5. Review and evaluate work plan and activities

5.1 Reviewing work plans, strategies and implementation

5.2 Performing comprehensive consultation review

5.3 Providing reviewed results

5.4 Preparing and documenting performance appraisal report

5.5 Preparing and presenting recommendations and implementing feedback mechanisms

Learning Methods:

- Lecture and Discussion
- Demonstration
- Simulation
- Role playing

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

ASSESSMENT CRITERIA:

LO1. Set objectives

- Objectives are planned consistent with and linked to work activities in accordance with organizational aims.
- Objectives are stated as measurable and achievable targets with clear time frames.
- Support and commitment of team members are reflected in the objectives.
- Realistic and attainable objectives are identified

LO2. Plan and schedule work activities

- Tasks/work activities to be completed are identified and prioritized as directed.
- Tasks/work activities are broken down into steps in accordance with set time frames and achievable components.
- Task/work activities are assigned to appropriate team or individuals in accordance with agreed functions.
- Resources are allocated as per requirements of the activity.
- Schedule of work activities is coordinated with personnel concerned.

LO3. Implement work plans

- Work methods and practices are identified in consultation with personnel concerned.
- Work plans are implemented in accordance with set time frames, resources and standards.

LO4. Monitor work activities

- Work activities are monitored and compared with set objectives.
- Work performance is monitored.
- Deviations from work activities are reported and recommendations are coordinated with appropriate personnel and in accordance with set standards.
- Reporting requirements are complied with in accordance with recommended format.
- Timeliness of report is observed.
- Files are established and maintained in accordance with standard operating procedures

LO5. Review and evaluate work plans and activities.

- Work plans, strategies and implementation are reviewed based on accurate, relevant and current information.
- Review is done based on comprehensive consultation with appropriate personnel on outcomes of work plans and reliable feedback.
- Results of review are provided to concerned parties and formed as the basis for

adjustments/simplifications to be made to policies, processes and activities.

- Performance appraisal is conducted in accordance with organization rules and regulations.
- Performance appraisal report is prepared and documented regularly as per textile processing requirements.
- Recommendations are prepared and presented to appropriate personnel/authorities.
- Feedback mechanisms are implemented in line with organization policies.

Annex: Resource Requirements

IND TPT4 M08 0222: Planning and Organizing textile processing 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	1:25
2	Reference book			
2.1	Complete Technology Book on Textile Processing with Effluent Treatment	NIIR Board, 2003	5	1:5
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	Area- 7*8m^2	1	1:25
2.	Library	Area- 30X30m^2	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**			
1	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	1	1:25

		▪ Connectivity: USB 2.0, Display Port ▪ Maximum RAM Capacity: 48 GB ▪ Hard Drive Capacity: 500 GB ▪ Max Turbo Frequency: 3.33 Ghz		
2	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	1:25

LEARNING MODULE 09
TVET-PROGRAMME TITLE: **Textile Processing Technology Level IV**
MODULE TITLE : Developing of new finished Textile Product
MODULE CODE : **IND TPT4 M09 0222**
NOMINAL DURATION : **80** Hours
MODULE DESCRIPTION : This module covers the knowledge, attitudes and skills required to develop a new product within an existing range of products and encompass design for manufacture and the facilitation of its initial production
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Confirm design of new product **LO2.** Determine material requirements for product **LO3.** Determine process requirements for product **LO4.** Ensure process needs for new product have been met **LO5.** Trial new product through the process **LO6.** Determine process capability **LO7.** Coordinate product trials **LO8**. Implement standard procedures for new product
MODULE CONTENTS: **LO1. Confirm design of new product** 1.1. Communication with customer and key stakeholders 1.2. Determining regulatory textile processing industry code/intellectual 1.3. Identifying possible tools/process/equipment 1.4. Developing design brief 1.5. Obtaining total design brief sign off **LO2. Determine material requirements for product** 2.1. Selecting appropriate materials in liaison 2.2. Determining material testing and evaluation regime 2.3. Arranging trial materials testing and evaluation 2.4. Guiding material trial process and interpreting material trial results 2.5. Determining final material specifications and value chain details

LO3. Determine process requirements for product

3.1. Selecting product process

3.2. Determining special process requirements

3.3. Communicating production personnel

3.4. Adjusting design

LO4. Ensure process needs for new product have been met

4.1. Liaising with equipment design/procurement personnel

4.2. Interpreting hardware specifications

4.3. Liaising with process personnel

4.4. Validating product design

LO5. Trial new product through the process

5.1. Trialing design procedure and liaising with stakeholders

5.2. Coordinating the new product trialing and Interpreting product trial results

5.3. Guiding product trial process and tuning the process

LO6. Determine process capability

6.1 Plotting statistical process control charts

6.2 Determining and comparing confidence limits

LO7. Coordinate product trials

7.1 Determining product testing and evaluation

7.2 Arranging trial product testing and evaluation

7.3 Interpreting product trial results and guide product trial process

7.4 Determining final product specification and making required changes

LO8. Implement standard procedures for new product

8.1. Monitoring initial production and adjusting process, conditions and materials

8.2. Ensuring updated process specification and reflecting developed optimized operation

8.3. Ensuring correct standard operating procedures

8.4. updating ensured equipment and records

8.5. Completing and submitting ensured project records

8.6. Archiving company procedure records

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

ASSESSMENT CRITERIA:

LO1. Confirm design of new product

- Communicate with customer and other key stakeholders and agree on technical specification, aesthetic requirements, timelines, cost and other market requirements with relevant personnel.
- Determine regulatory textile processing industry code/intellectual property requirements for new product
- Identify possible tools/process/equipment needs
- Develop design brief, including relevant drawings, to meet needs
- Obtain 'sign off' on total design brief from all relevant persons

LO2. Determine material requirements for product

- Select appropriate materials/combination of materials/ components in liaison with key stakeholders
- Determine material/component testing and evaluation regime required to meet product end use requirements, including regulatory /textile processing industry code requirements
- Arrange for, testing and evaluation of trial materials/ components
- Guide material trial process and interpret material trial results
- Determine final materials/components specifications and details of value chain

LO3. Determine process requirements for product

- Select appropriate process to make product in liaison with key stakeholders and based on relevant factors
- Determine any special process/equipment requirements for this product
- Communicate with production personnel to determine their concerns and/or training or other needs
- Adjust the design as required to satisfy customer and production needs

LO4. Ensure process needs for new product have been met

- Liaise with equipment design/procurement personnel
- Interpret hardware specifications and ensure they are appropriate for the job required
- Liaise with process personnel to ensure appropriate draft procedures for new product have been developed
- Validate product design meets objectives

LO5. Trial new product through the process

- Design trialing procedure to deliver required information
- Liaise with relevant stakeholders
- Ensure health safety and environment (HSE) requirements are stringently observed
- Coordinate the trialing of the new product
- Interpret product trial results and guide product trial process
- Tune process to optimize production of new product

LO6. Determine process capability

- Plot appropriate statistical process control charts
- Determine confidence limits
- Compare confidence limits with product specification

LO7. Coordinate product trials

- Determine product testing and evaluation regime required to meet end use requirements, including regulatory/industry code requirements
- Arrange for testing and evaluation of trial product/prototype
- Interpret product trial results and guide product trial process
- Determine final product specification in liaison with key stakeholders
- Make required changes to materials, process and equipment

LO8. Implement standard procedures for new product

- Monitor initial production and, in liaison with appropriate team members, adjust process, conditions and materials to ensure the product and process outcomes conform to requirements
- Ensure process specifications are updated and reflect the optimized operation developed
- Ensure standard operating procedures are correct for the new product
- Ensure equipment and other hardware records are updated to reflect additions/changes
- Ensure project records are complete and all required reports have been completed and submitted
- Archive records according to company procedure

Annex: Resource Requirements

IND TPT4 M09 0222: Develop of New finished Textile Product				
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
2	Reference book			
2.1	New Product Development in Textiles Innovation and Production	1st Edition - November 24, 2011	5	1:5
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	Area- 7*8m^2	1	1:25
2.	Library	Area- 30X30m^2	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**			
1	Computer	▪ RAM Size: 12 GB ▪ Processor Speed: 2.93 GHz ▪ Features: Built-in Speakers ▪ Processor: Intel Xeon 8-Core ▪ Graphics Processing Type: Dedicated Graphics	1	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		
2	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	1:25

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 IV**.

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The trainers who developed the curriculum

No	Name	Qualification	Educational background	Region	College	Mobile number	E-mail
1	Tahir Abiyo	Msc	MED in Textile Technology	Oromia	Athlete Kenenisa Polytechnic college	0910605550	tahirdiba95@gmail.com
2	Tambizot Getachew	Masters	M.Tech in Fibres and textile processing technology	Addis Ababa	ETIDI	0936694972	tambizotgetachew10@gmail.com
3	Robel Legese	Masters	MSC in Textile Chemistry	Addis Ababa	Ethiopian Technical Institute	0910447294	robellegese1@gmail.com
4	Samueal Mohammed	Degree	BED in Textile Technology	Addis Ababa	General Wingate Polytechnic College	0910694912	samuealmoha2095@gmail.com
5	Asfaw Azene	Masters	MED in Textile Technology	Amhara	D/berhan Polytechnic college	0913852831	azeneasfaw2008@gmail.com
6.	Abreham Menchemo	Degree	Banking & Insurance	Hawassa	South TVET	0910066725	menchbet@gmail.com