REPUBLIC OF KENYA

COMPETENCY BASED CURRICULUM

FOR

TEXTILE TECHNOLOGY

LEVEL 6

TVET CDACC
TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL
KENYA
for competence certification

TVET CDACC
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FOREWORD

The provision of quality education and training is fundamental to the Government's overall strategy for social economic development. Quality education and training will contribute to achievement Kenya's development blue print and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution and this resulted to the formulation of the Policy Framework for Reforming Education and Training. A key feature of this policy is the radical change in the design and delivery of the TVET training. This policy document requires that training in TVET be competency based, curriculum development be industry led, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this Curriculum has been developed.

It is my conviction that this curriculum will play a great role towards development of competent human resource for the Textile sector's growth and sustainable development

PRINCIPAL SECRETARY
VOCATIONAL AND TECHNICAL TRAINING
MINISTRY OF EDUCATION

PREFACE

Kenya Vision 2030 aims to transform the country into a newly industrializing, "middle-income country providing a high-quality life to all its citizens by the year 2030". Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) in conjunction with Textile Sector Skills Advisory Committee (SSAC) and other stakeholders have developed this curriculum.

This curriculum has been developed following the CBET framework policy; the CBETA Standards and guidelines provided by the TVET Authority and the Kenya National Qualification framework designed by the Kenya National Qualification Authority.

The curriculum is designed and organized with an outline of learning outcomes; suggested delivery methods, training/learning resources and methods of assessing the trainee's achievement. The curriculum is competency-based and allows multiple entry and exit to the course.

I am grateful to the Council Members, Council Secretariat, Textile SSAC, expert workers and all those who participated in the development of this curriculum.

CHAIRPERSON
TVET CDACC

ACKNOWLEDGMENT

This curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the curriculum, significant involvement and support was received from various organizations.

I appreciate Textile Technician Sector Skills Advisory Committee (SSAC) who enabled the development of this curriculum.

I recognize with appreciation the role of the SSAC in ensuring that competencies required by the industry are addressed in this curriculum. I also thank all stakeholders in the Textile sector for their valuable input and all those who participated in the process of developing this curriculum.

I am convinced that this curriculum will go a long way in ensuring that workers in Textile sector will acquire competencies that will enable them to perform their work more efficiently.

COUNCIL SECRETARY/CEO
TVET CDACC

ABBREVIATION AND ACRONYMS

BC	Basic Competency
CC	Common Competency
CDACC	Curriculum Development, Assessment and Certification Council
CPU	Control Powering Unit
CR	Core Competency
ENG	Engineering
GPS	Global positioning system
ICT	Information and Communication Technology
IT	Information Technology
KCSE	Kenya Certificate of Secondary Education
OBD	On-board diagnostics
OS	Occupational Standards
PPE	Personal protective equipment
SOP	Standard Operating Procedures
TEX	Textile
TQM	Total Quality Management
TVET	Technical and Vocational Education and Training

KEY TO UNIT CODE

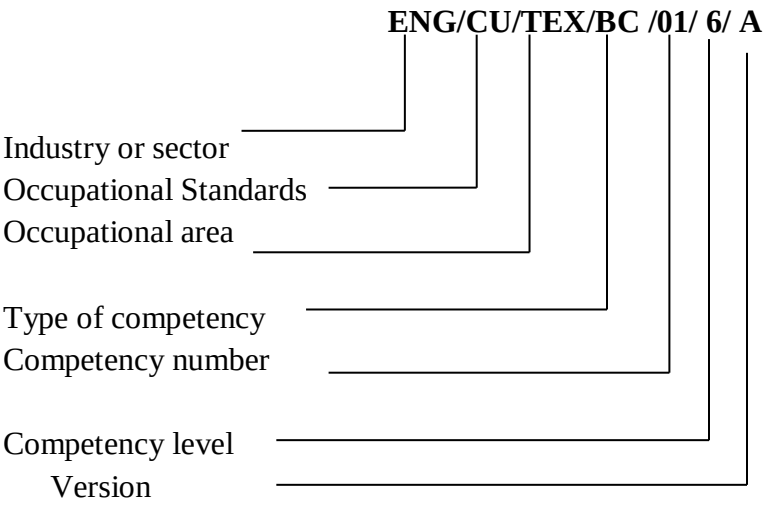

TABLE OF CONTENTS

COURSE OVERVIEW

The Textile Technology Level 6 consists of competencies that a person must achieve to enable him/her to work in a Textile Industry. It entails textile material testing, producing textile yarn (spinning), producing woven fabric (weaving), producing knitted fabric, producing nonwoven fabric, processing textile fabric, operating textile machines/equipment and managing textile production process

The units of learning for Textile Technology level 6 qualifications include the following basic, common and core competencies:

BASIC UNITS OF LEARNING			
Unit of Learning Code	**Units of Learning Title**	**Duration in Hours**	**Credits Factors**
ENG/CU/TEX/BC/01/6/A	Communication Skills	40	4
ENG/CU/TEX/BC/02/6/A	Digital Literacy	60	6
ENG/CU/TEX/BC/03/6/A	Entrepreneurial Skills	100	10
ENG/CU/TEX/BC/04/6/A	Employability Skills	80	8
ENG/CU/TEX/BC/05/6/A	Environmental Literacy	40	4
ENG/CU/TEX/BC/06/6/A	Occupational Safety and Health Practices	40	4
TOTAL		**360**	**36**
COMMON UNITS OF LEARNING			
ENG/CU/TEX/CC/01/6/A	Technical Drawing	150	15
ENG/CU/TEX/CC/02/6/A	Engineering Mathematics	150	15
ENG/CU/TEX/CC/03/6/A	Mechanical Science Principles	80	8
ENG/CU/TEX/CC/04/6/A	Fluid Mechanics Principles	90	9
ENG/CU/TEX/CC/05/6/A	Material Science Principles	90	9
TOTAL		**560**	**56**
CORE UNITS OF LEARNING			
ENG/CU/TEX/CR/01/6/A	Textile Testing	140	14

ENG/CU/TEX/CR/02/6/A	Textile Yarn Production (Spinning)	150	15
ENG/CU/TEX/CR/03/6/A	Woven Fabric Production (Weaving)	160	16
ENG/CU/TEX/CR/04/6/A	Fabric Knitting	150	15
ENG/CU/TEX/CR/05/6/A	Nonwoven Fabrics	150	15
ENG/CU/TEX/CR/06/6/A	Textile Processing	150	15
ENG/CU/TEX/CR/07/6/A	Production Process Management	100	10
	Industrial Attachment	480	48
TOTAL		**1480**	**148.0**
GRAND TOTAL		**2400**	**240.0**

1. **Entry Requirements**

   An individual entering this course should have any of the following minimum requirements:

a) Kenya Certificate of Secondary Education (K.C.S.E.) with a minimum mean grade of C- (C minus)

Or

b) Level 5 certificate in textile engineering with **one** year of continuous work experience

Or

c) Equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA)

2. **Trainer qualification**

   A trainer for this course should have a higher qualification than the level of this course.

3. **Assessment**

   The course will be assessed at two levels: internally and externally. Internal assessment is continuous and is conducted by the trainer who is monitored by an internal accredited verifier while external assessment is the responsibility of TVET CDACC.

4. Certification

A candidate will be issued with a record of Achievement on demonstration of competence in a unit of competency. To attain the qualification national certificate in Textile Technology Level 6, the candidate must demonstrate competence in all the units of competency as given in qualification pack. TVET CDACC will issue these certificates in conjunction with training provider.

BASIC UNITS OF LEARNING

COMMUNICATION SKILLS

UNIT CODE: ENG/CU/TEX/BC/01/6/A

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate Communication Skills

Duration of Unit: 40 hours

Unit Description
This unit covers the competencies required to demonstrate communication skills. It involves, meeting communication needs of clients and colleagues; developing communication strategies, establishing and maintaining communication pathways, conducting interviews, facilitating group discussion and representing the organization.

Summary of Learning Outcomes

1. Meet communication needs of clients and colleagues
2. Develop communication strategies
3. Establish and maintain communication pathways
4. Promote use of communication strategies
5. Conduct interview
6. Facilitate group discussion
7. Represent the organization

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Meet communication needs of clients and colleagues	• Communication process • Modes of communication • Medium of communication • Effective communication • Barriers to communication • Flow of communication • Sources of information • Organizational policies • Organization requirements for written and electronic communication methods • Report writing	• Interview • Written texts

	• Effective questioning techniques (clarifying and probing) • Workplace etiquette • Ethical work practices in handling communication • Active listening • Feedback • Interpretation • Flexibility in communication • Types of communication strategies • Elements of communication strategy	
2. Develop communication strategies	• Dynamics of groups • Styles of group leadership • Openness and flexibility in communication • Communication skills relevant to client groups	• Interview • Written texts
3. Establish and maintain communication pathways	• Types of communication pathways	• Interview • Written texts
4. Promote use of communication strategies	• Application of elements of communication strategies • Effective communication techniques	• Interview • Written texts
5. Conduct interview	• Types of interview • Establishing rapport • Facilitating resolution of issues • Developing action plans	• Interview • Written texts
6. Facilitate group discussion	• Identification of communication needs • Dynamics of groups • Styles of group leadership • Presentation of information • Encouraging group members participation	• Interview • Written texts

	• Evaluating group communication strategies	
7. Represent the organization	• Presentation techniques • Development of a presentation • Multi-media utilization in presentation • Communication skills relevant to client groups	• Interview • Written texts

Suggested Methods of Instruction

- Discussion
- Role playing
- Simulation
- Direct instruction

Recommended Resources

- Desktop computers/laptops
- Internet connection
- Projectors
- Telephone

DIGITAL LITERACY

UNIT CODE: ENG/CU/TEX/BC/02/6/A

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate Digital Literacy

Duration of Unit: 60 hours

Unit Description
This unit describes competencies required to demonstrate digital literacy. It involves in identifying computer software and hardware, applying security measures to data, hardware, software in automated environment, computer software in solving task, internet and email in communication at workplace, desktop publishing in official assignments and preparing presentation packages.

Summary of Learning Outcomes
1. Identify computer software and hardware
2. Apply security measures to data, hardware, software in automated environment
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace
5. Apply desktop publishing in official assignments
6. Prepare presentation packages

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify computer hardware and software	• Concepts of ICT • Functions of ICT • History of computers • Components of a computer • Classification of computers	• Written tests • Oral presentation
2. Apply security measures to data, hardware, software in automated environment	• Data security and control • Security threats and control measures • Types of computer crimes • Detection and protection against computer crimes	• Written tests • Oral presentation • Project

	• Laws governing protection of ICT	
3. Apply computer software in solving tasks	• Operating system • Word processing • Spread sheets • Data base design and manipulation • Data manipulation, storage and retrieval	• Oral questioning • Project
4. Apply internet and email in communication at workplace	• Computer networks • Network configurations • Uses of internet • Electronic mail (e-mail) concept	• Oral questioning • Written report
5. Apply desktop publishing in official assignments	• Concept of desktop publishing • Opening publication window • Identifying different tools and tool bars • Determining page layout • Opening, saving and closing files • Drawing various shapes using DTP • Using colour pellets to enhance a document • Inserting text frames • Importing and exporting text • Object linking and embedding • Designing of various publications • Printing of various publications	• Oral questioning • Written report • Project
6. Prepare presentation packages	• Types of presentation packages • Procedure of creating slides • Formatting slides • Presentation of slides • Procedure for editing objects	• Oral questioning • Written report • Project

Suggested Methods of Instruction

- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos
- Project
- Group discussions

Recommended Resources

- Computers
- Printers
- Storage devices
- Internet access

ENTREPRENEURIAL SKILLS

UNIT CODE: ENG/CU/TEX/BC/03/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

Duration of unit: 100 hours

Unit Description

This unit covers the competencies required to demonstrate understanding of entrepreneurship. It involves demonstrating understanding of an entrepreneur, entrepreneurship and self-employment. It also involves identifying entrepreneurship opportunities, creating entrepreneurial awareness, applying entrepreneurial motivation and developing business innovative strategies.

Summary of Learning Outcomes

1. Demonstrate understanding of who an entrepreneur
2. Demonstrate knowledge of entrepreneurship and self-employment
3. Identify entrepreneurship opportunities
4. Create entrepreneurial awareness
5. Apply entrepreneurial motivation
6. Develop business innovative strategies
7. Develop Business plan

Learning Outcome	Content	Suggested Assessment Methods
1. Demonstrate knowledge of entrepreneurship and self-employment	• Importance of self-employment • Requirements for entry into self-employment • Role of an Entrepreneur in business • Contributions of Entrepreneurs to National development • Entrepreneurship culture in Kenya • Born or made entrepreneurs	• Individual/group assignments • Projects • Written tests • Oral questions • Third party report

2. Identify entrepreneurship opportunities	• Business ideas and opportunities • Sources of business ideas • Business life cycle • Legal aspects of business • Assessment of product demand • Business environment • Factors to consider when evaluating business environment • Technology in business	• Individual/group assignments • Projects • Written tests • Oral questions • Third party report • Interviews
3. Create entrepreneurial awareness	• Forms of businesses • Sources of business finance • Factors in selecting source of business finance • Governing policies on Small Scale Enterprises (SSEs) • Problems of starting and operating SSEs	• Individual/group assignments • Projects • Written tests • Oral questions • Third party report • Interviews
4. Apply entrepreneurial motivation	• Internal and external motivation • Motivational theories • Self-assessment • Entrepreneurial orientation • Effective communications in entrepreneurship • Principles of communication • Entrepreneurial motivation	• Case studies • Individual/group assignments • Projects • Written tests • Oral questions • Third party report • Interviews
5. Develop business innovative strategies	• Innovation in business • Small business Strategic Plan • Creativity in business development • Linkages with other entrepreneurs • ICT in business growth and development	• Case studies • Individual/group assignments • Projects • Written tests • Oral questions • Third party report • Interviews

6. Develop Business Plan	• Business description • Marketing plan • Organizational/Management • plan • Production/operation plan • Financial plan • Executive summary • Presentation of Business Plan	• Case studies • Individual/group assignments • Projects • Written tests • Oral questions • Third party report • Interviews

Suggested Methods of Instruction

- Direct instruction
- Project
- Case studies
- Field trips
- Discussions
- Demonstration
- Question and answer
- Problem solving
- Experiential
- Team training

Recommended Resources

- Case studies
- Business plan templates
- Computers
- Overhead projectors
- Internet
- Mobile phone
- Video clips
- Films
- Newspapers and Handouts
- Business Journals
- Writing materials

EMPLOYABILITY SKILLS

UNIT CODE: ENG/CU/TEX/BC/04/6/A

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate Employability Skills

Duration of Unit: 80 hours

Unit Description
This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating interpersonal communication, critical safe work habits, leading a workplace team, planning and organizing work, maintaining professional growth and development, demonstrating workplace learning, problem solving skills and managing ethical performance.

Summary of Learning Outcomes

1. Conduct self-management
2. Demonstrate interpersonal communication
3. Demonstrate critical safe work habits
4. Lead a workplace team
5. Plan and organize work
6. Maintain professional growth and development
7. Demonstrate workplace learning
8. Demonstrate problem solving skills
9. Manage ethical performance

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Conduct self-management	• Self-awareness • Formulating personal vision, mission and goals • Strategies for overcoming life challenges • Managing emotions • Emotional intelligence	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report

	• Assertiveness versus aggressiveness • Expressing personal thoughts, feelings and beliefs • Developing and maintaining high self-esteem • Developing and maintaining positive self-image • Setting performance targets • Monitoring and evaluating performance • Articulating ideas and aspirations • Accountability and responsibility • Good work habits • Self-awareness • Values and beliefs • Self-development • Financial literacy • Healthy lifestyle practices • Adopting safety practices	
2. Demonstrate interpersonal communication	• Meaning of interpersonal communication • Listening skills • Types of audience • Public speaking • Writing skills • Negotiation skills • Reading skills • Meaning of empathy • Understanding customers' needs • Establishing communication networks • Assertiveness • Sharing information	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report

3. Demonstrate critical safe work habits	• Stress and stress management • Time concept • Punctuality and time consciousness • Leisure • Integrating personal objectives into organizational objectives • Resources mobilization • Resources utilization • Setting work priorities • Developing healthy relationships • HIV and AIDS • Drug and substance abuse • Managing emerging issues	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report
4. Lead a workplace team	• Leadership qualities • Power and authority • Team building • Determination of team roles and objectives • Team parameters and relationships • Individual responsibilities in a team • Forms of communication • Complementing team activities • Gender and gender mainstreaming • Human rights • Developing healthy relationships • Maintaining relationships • Conflicts and conflict resolution • Coaching and mentoring skills	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report
5. Plan and organize work	• Functions of management • Planning	• Written tests • Oral questioning

	• Organizing • Time management • Decision making concept • Task allocation • Developing work plans • Developing work goals/objectives and deliverables • Monitoring work activities • Evaluating work activities • Resource mobilization • Resource allocation • Resource utilization • Proactive planning • Risk evaluation • Problem solving • Collecting, analysing and organising information • Negotiation	• Interviewing • Portfolio of evidence • Third party report
6. Maintain professional growth and development	• Avenues for professional growth • Training and career opportunities • Assessing training needs • Mobilizing training resources • Licenses and certifications for professional growth and development • Pursuing personal and organizational goals • Managing work priorities and commitments • Recognizing career advancement	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report
7. Demonstrate workplace learning	• Managing own learning • Mentoring • Coaching	• Written tests • Oral questioning • Interviewing

	• Contributing to the learning community at the workplace • Cultural aspects of work • Networking • Variety of learning context • Application of learning • Safe use of technology • Taking initiative/proactivity • Flexibility • Identifying opportunities • Generating new ideas • Workplace innovation • Performance improvement • Managing emerging issues • Future trends and concerns in learning	• Portfolio of evidence • Third party report
8. Demonstrate problem solving skills	• Critical thinking process • Data analysis tools • Decision making • Creative thinking • Development of creative, innovative and practical solutions • Independence in identifying and solving problems • Solving problems in teams • Application of problem-solving strategies • Testing assumptions • Resolving customer concerns	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report
9. Manage ethical performance	• Meaning of ethics • Ethical perspectives • Principles of ethics • Ethical standards • Organization code of ethics • Common ethical dilemmas • Organization culture	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report

	• Corruption, bribery and conflict of interest • Privacy and data protection • Diversity, harassment and mutual respect • Financial responsibility/accountability • Etiquette • Personal and professional integrity • Commitment to jurisdictional laws • Emerging issues in ethics	

Suggested Methods of Instruction

- Demonstrations
- Simulation/Role play
- Group Discussion
- Presentations
- Assignments
- Q&A

Recommended Resources

- Computers
- Stationery
- Charts
- Video clips
- Audio tapes
- Radio sets
- TV sets
- LCD projectors

ENVIRONMENTAL LITERACY

UNIT CODE: ENG/CU/TEX/BC/05/6/A

Relationship to Occupational Standards:
This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

Duration of Unit: 40 hours

Unit Description
This unit describes the competencies required demonstrate environmental literacy.it involves controlling environmental hazard, controlling environmental pollution, complying with workplace sustainable resource use, evaluating current practices in relation to resource usage, identifying environmental legislations/conventions for environmental concerns, implementing specific environmental programs, monitoring activities on environmental protection/programs, analysing resource use and developing resource conservation plans.

Summary of Learning Outcomes
1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use
4. Evaluate current practices in relation to resource usage
5. Identify Environmental legislations/conventions for environmental concerns
6. Implement specific environmental programs
7. Monitor activities on Environmental protection/Programs
8. Analyze resource use
9. Develop resource conservation plans

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Control environmental hazard	• Purposes and content of Environmental Management and Coordination Act 1999 • Storage methods for environmentally hazardous materials	• Written questions • Oral questions

	• Disposal methods of hazardous wastes • Types and uses of PPE in line with environmental regulations • Occupational Safety and Health Standards (OSHS)	
2. Control environmental Pollution control	• Types of pollution • Environmental pollution control measures • Types of solid wastes • Procedures for solid waste management • Different types of noise pollution • Methods for minimizing noise pollution	• Written questions • Oral questions • Role play
3. Demonstrate sustainable resource use	• Types of resources • Techniques in measuring current usage of resources • Calculating current usage of resources • Methods for minimizing wastage • Waste management procedures • Principles of 3Rs (Reduce, Reuse, Recycle) • Methods for economizing or reducing resource consumption	• Written questions • Oral questions • Role play
4. Evaluate current practices in relation to resource usage	• Collection of information on environmental and resource efficiency systems and procedures, • Measurement and recording of current resource usage • Analysis and recording of current purchasing strategies. • Analysis of current work processes to access information and data	• Written questions • Oral questions • Role play

	• Identification of areas for improvement	
5. Identify Environmental legislations/conventions for environmental concerns	• Environmental issues/concerns • Environmental legislations /conventions and local ordinances • Industrial standard /environmental practices • International Environmental Protocols (Montreal, Kyoto) • Features of an environmental strategy	• Written questions • Oral questions
6. Implement specific environmental programs	• Community needs and expectations • Resource availability • 5s of good housekeeping • Identification of programs/Activities • Setting of individual roles /responsibilities • Resolving problems /constraints encountered • Consultation with stakeholders	• Written questions • Oral questions • Role play
7. Monitor activities on Environmental protection/Programs	• Periodic monitoring and Evaluation of activities • Gathering feedback from stakeholders • Analyzing data gathered • Documentation of recommendations and submission • Setting of management support systems to sustain and enhance the program • Monitoring and reporting of environmental incidents to concerned /proper authorities	• Oral questions • Written tests • Practical test

8. Analyze resource use	• Identification of resource consuming processes • Determination of quantity and nature of resource consumed • Analysis of resource flow through different parts of the process. • Classification of wastes for possible source of resources.	• Written tests • Oral questions • Practical test
9. Develop resource Conservation plans	• Determination of efficiency of use/conversion of resources • Causes of low efficiency of use of resources • Plans for increasing the efficiency of resource use	• Written tests • Oral questions • Practical test

Suggested Methods of Instruction

- Instructor led facilitation of theory
- Practical demonstration of tasks by trainer
- Practice by trainees
- Observations and comments and corrections by trainers

Recommended Resources

- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Environmental Management and Coordination Act 1999
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE)
- ISO standards
- Ccompany environmental management systems (EMS)
- Montreal Protocol
- Kyoto Protocol

OCCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE: ENG/CU/TEX/BC/06/6/A

Relationship to Occupational Standards
This unit addresses the unit of competency: Demonstrate Occupational Safety and Health Practices

Duration of Unit: 40 hours

Unit Description
This unit specifies the competencies required to demonstrate occupational health and safety practices. It involves identifying workplace hazards and risk, identifying and implementing appropriate control measures to hazards and risks and implementing OSH programs, procedures and policies/guidelines.

Summary of Learning Outcomes
1. Identify workplace hazards and risk
2. Control OSH hazards
3. Implement OSH programs

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify workplace hazards and risks	• Identification of hazards in the workplace and/or the indicators of their presence • Evaluation and/or work environment measurements of OSH hazards/risk existing in the workplace • Gathering of OSH issues and/or concerns	• Oral questions • Written tests • Portfolio of evidence • Third party report
2. Control OSH hazards	• Prevention and control measures e.g. use of PPE • Risk assessment • Contingency measures	• Oral questions • Written tests • Portfolio of evidence

		• Third party report
3. Implement OSH programs	• Company OSH program, evaluation and review • Implementation of OSH programs • Training of team members and advice on OSH standards and procedures • Implementation of procedures for maintaining OSH-related records	• Oral questions • Written tests • Portfolio of evidence • Third party report

Suggested Methods of Instruction

- Assigments
- Discussion
- Q&A
- Role play
- Viewing of related videos

Recommended Resources

- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE) e.g.
    - Mask
    - Face mask/shield
    - Safety boots
    - Safety harness
    - Arm/Hand guard, gloves
    - Eye protection (goggles, shield)
    - Hearing protection (ear muffs, ear plugs)
    - Hair Net/cap/bonnet
    - Hard hat
    - Face protection (mask, shield)
    - Apron/Gown/coverall/jump suit
    - Anti-static suits

- High-visibility reflective vest

COMMON UNITS OF LEARNING

TECHNICAL DRAWING

UNIT CODE: ENG/CU/TEX/CC/01/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Prepare and Interpret Technical Drawings

Duration of Unit: 150 Hours

Unit Description

This unit covers the competencies required to prepare and interpret technical drawings by a Plant technician. It involves competencies to select, use and maintain drawing equipment and materials. It also involves producing plain geometry drawings, solid geometry drawings, pictorial and orthographic drawings of components and application of CAD software.

Summary of Learning Outcomes

1. Use and maintain drawing equipment and materials
2. Produce plain geometry drawings
3. Produce solid geometry drawings
4. Produce pictorial and orthographic drawings of components
5. Produce assembly drawings
6. Apply CAD software

Learning Outcomes, Content and Suggested Assessment Methods:

Learning Outcome	Content	Suggested Assessment Methods
1. Use and maintain drawing equipment and materials	• Identification and maintain of drawing equipment and materials • Identification and maintain of drawing materials	• Observation • Oral questioning • Written tests
2. Produce plain geometry drawings	• Lettering in drawing • Types of lines in drawings • Construction of geometric forms • Construction of different angles	• Oral questioning • Written tests • Observation

	• Measurement of different angles • Standard drawing conventions	

3. Produce solid geometry drawings	• Interpretation of sketches and drawings of patterns
	  • Cylinders
	  • Prisms
	  • Pyramids
	• Development of surface of interpenetrating solids and truncated solids
	• Interpenetrations of solids
	  • Cylinder to cylinder,
	  • Cylinder to prism,
	  • Prism to prism of equal and unequal diameters
		• Observation
		• Written tests
		• Oral questioning

4. Produce pictorial and orthographic drawings of components	• Meaning of pictorial and orthographic drawings and sectioning • Meaning of symbols and abbreviations • Drawing of isometric, oblique, axonometric, auxiliary and perspective views • Drawing of first and third angle projections • Sectioning of components • Free hand sketching of tools, equipment, components, geometric forms and diagrams	• Observation • Written test • Oral test
5. Produce assembly drawings	• Explosion of orthographic views • Explosion of pictorial views • Identification and listing of parts • Production of sectional views • Hatching of drawings	• Observation • Written test • Oral test

6. Apply CAD software in drawing	• Meaning and types of CAD e.g. • Auto CAD • Archi CAD • Solid works • Inventor • Circuit maker • Electronic work bench • 2D and 3Ddrafting technique • Annotation of models	• Practical • Observation • Written tests

Suggested methods of instruction

- Projects
- Demonstration
- Practice by the trainee
- Field trips
- Group discussions
- Direct instructions

Recommended Resources

- Drawing room
- Computer lab
- Drawing equipment and materials
- Computers
- CAD package
- Overhead projector

ENGINEERING MATHEMATICS

UNIT CODE:ENG/CU/TEX/CC/02/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Apply Engineering Mathematics

Duration of Unit: 150 hours

Unit Description

This unit describes the competencies required by a Plant technician in order to apply algebra, apply trigonometry and hyperbolic functions, apply complex numbers, apply coordinate geometry, apply calculus, solve ordinary differential equations, carry out mensuration, apply power series, apply statistics, apply numerical methods, apply vector theory and apply matrix.

Summary of Learning Outcomes

1. Use concepts of arithmetic in solving work problems
2. Use common formula and algebraic expressions for work
3. Use trigonometry to solve practical engineering problems
4. Perform estimations, measurements and calculations
5. Apply matrices in work
6. Apply vectors in work
7. Collect, organize and interpret statistical data
8. Apply concepts of probability for work
9. Perform commercial calculations

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Use concepts of arithmetic in solving work problems	• Fundamental operations • Addition, • Subtraction, • Multiplication, • Division of positive and negative numbers • Fractions and decimals operations and conversions • Indices	• Written tests • Oral questioning • Assignments • Supervised exercises •

	• Ratios and proportions • Meaning • Conversions into percentages • Direct and inverse proportions determination • Use of scientific calculator	
2. Use formulae and algebraic expressions for work	• Algebraic linear equations • Simultaneous • Quadratic • Linear graphs • Plotting • Interpretation • Applications of linear graphs • Curves of first and second degree • Plotting • Interpretation • Applications	• Written tests • Oral questioning • Assignments • Supervised exercises • •
3. Use trigonometry to solve practical work problems	• Meaning of trigonometry • Pythagoras theorem • Trigonometry ratios of angles • Trigonometric identities • Conversion of angles	• Assignments • Oral questioning • Supervised exercises • Written tests
4. Perform estimations, measurements and calculations of quantities	• Units of measurements and their symbols • Conversion of units of measurement • Calculation of length, width, height, perimeter, area and angles of figures • Measuring tools and equipment • Performing measurements and estimations of quantities	• Assignments • Oral questioning • Practical tests • Observation • Supervised exercises • Written tests
5. Apply matrices in work	• Meaning of matrix • Types of matrices • Matrix operations • Compatibility • Addition • Subtraction • Multiplication	• Assignments • Supervised exercises • Written tests •

	• Determination of inverse of a matrix • Solution of simultaneous equations with two and three unknowns • Applications of matrices	
6. Collect, organize and interpret statistical data	• Classification of data • Grouped data • Ungrouped data • Data collection • Importance of sampling • Errors in sampling • Types of sampling and their limitations • Tabulation of data • Class intervals • Class boundaries • Frequency tables • Cumulative frequency • Diagrammatic and graphical presentation of data e.g. • Histograms • Frequency polygons • Bar charts • Pie charts • Cumulative frequency curves • Meaning of measures of central tendency • Measures • Properties • Calculation and interpretation of mean, mode and median • Variance and standard deviation	• Assignments • Oral questioning • Supervised exercises • Written tests •
7. Apply vectors in work	• Meaning of vector • Representations of vectors • Operations of vectors • Addition • Subtraction • Scalar and vector products • Determination of angles	• Assignments • Supervised exercises • Written tests •

8. Apply concepts of probability in work	• Meaning of probability • Types of probability events • Dependent • Independent • Mutually exclusive • Laws of probability • Counting techniques • Permutation • Combination • Tree diagrams • Ven diagrams	• Written tests • Assignments • Supervised exercises • •
9. Perform commercial calculations	• Product pricing • Average sales determination • Stock turnover • Calculation of incomes • Profit and loss calculations • Salaries • Gross • Net • Wages • Time rate • Flat rate • Overtime • Piece rate • Commission • Percentage • Bonus • Conversion of one currency to another • Exchange rates calculation • Devaluation • Revaluation	• Oral questioning • Written tests • Assignments • Supervised exercises

Suggested methods of Instruction

- Group discussions
- Demonstration by trainer
- Exercises by trainee

Recommended Resources

- Scientific Calculators
- Rulers, pencils, erasers

- Charts with presentations of data
- Graph books
- Dice
- Computers with internet connection

MECHANICAL SCIENCE PRINCIPLES

UNIT CODE: ENG/CU/TEX/CC/03/6/A

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Apply Mechanical Science Principles

Duration of Unit: 80 hours

Unit Description
This unit describes the competencies required by a technician in order to apply a wide range of Mechanical science principles in their work. It includes using concepts of mechanical science, determining effects of loading on static and dynamic engineering systems, analyse properties of materials, determine parameters of a fluid system and use of basic systems in power transfer.

Summary of Learning Outcomes

1. Use the concept of mechanical science
2. Determine effects of loading in static and dynamic engineering systems
3. Analyse properties of materials
4. Determine parameters of a fluid system
5. Use of basic mechanical systems in power transfer

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Use the concept of mechanical science	• Define work, force, mechanical advantage and efficiency • State and explain newton's laws of motion • Calculation velocity, distance, and acceleration • Conversion and SI units of energy, power and work	• Written tests • Oral questioning • Assignments • Supervised exercises •
2. Determine effects of loading in static and dynamic	• Explain type of forces • Discussion and analysis of reaction of forces	• Written tests • Oral questioning

engineering systems	• Calculation of coefficient of friction and inclined plane • Resolve the forces • Calculate the resultant force and equilibrium • Discuss the application of different forces • Calculation of moments of a force,	• Assignments • Supervised exercises • •
3. Analyse properties of materials	• Definition of mechanical properties of materials • Draw the stress strain graph • Discuss application of material depending on their properties • Discuss effect of environmental factors on material properties.	• Assignments • Oral questioning • Supervised exercises • Written tests
4. Determine parameters of a fluid system	• Discussion of Pascal's principles • Measuring fluid parameters • State the laws of gases • Discuss properties of water and steam	• Assignments • Oral questioning • Practical tests • Observation • Supervised exercises • Written tests
5. Use of basic mechanical systems in power transfer	• Uses and working principle of Gear trains • Uses and working principles of Pulley system, hoists and lifts • Uses and working principles of screws	• Assignments • Supervised exercises • Written tests • Practical test

Suggested Methods of Instruction

- Group discussions
- Demonstration by trainer
- Online video clips
- Power point presentation
- Exercises by trainee

Recommended Resources

- Scientific Calculators
- Relevant reference materials
- Stationeries

- Electrical workshop
- Relevant practical materials
- Dice
- Computers with internet connection

FLUID MECHANICS PRINCIPLES

UNIT CODE:ENG/CU/TEX/CC/04/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Apply Fluid Mechanics Principles

Duration of Unit: 90 hours

Unit Description

This unit describes the competencies required by a Plant technician in order to apply a wide range of fluid mechanics principles in their work. It includes understanding flow of fluids, demonstrating knowledge in viscous flow, performing dimensional analysis and operating fluid pumps.

Summary of Learning Outcomes

1. Understand flow of fluids
2. Demonstrate knowledge in viscous flow
3. Perform dimensional analysis
4. Operate fluid pumps

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Understand flow of fluids	• Flow rate in pipes • Losses in pipes • Causes of losses in pipes • Application of flow loss equations	• Written tests • Oral questioning • Assignments • Supervised exercises
2. Demonstrate knowledge in viscous flow	• Viscous flow between parallel surfaces • Viscous flow equations • Application of viscous flow equations	• Written tests • Oral questioning • Assignments • Supervised exercises •
3. Perform dimensional analysis	• Dimensional analysis definition • Principle of dimensional homogeneity	• Assignments • Oral questioning

	• Fundamental dimensions and units • Physical quantities • Application of dimensional analysis	• Supervised exercises • Written tests
4. Operate fluid pumps	• Principle of operation of pumps • Reciprocating pump equation • Centrifugal pump equation • Application of pump equations in problem solving	• Assignments • Oral questioning • Practical tests • Observation • Supervised exercises • Written tests

Suggested Methods of Instruction

- Group discussions
- Demonstration by trainer
- Online video clips
- Power point presentation
- Exercises by trainee

Recommended Resources

- Scientific Calculators
- Relevant reference materials
- Stationeries
- Relevant practical materials
- Dice
- Computers with internet connection

MATERIAL SCIENCE PRINCIPLES

UNIT CODE: ENG/CU/TEX/CC/05/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: **Apply Material Science Principles**

Duration of Unit: 90 hours

Unit Description:

The learner will be introduced to performing material testing. It involves analysing properties of engineering materials, performing extraction processes, producing iron materials, ceramics, composites and alloys, performing heat treatment, material testing and identifying corrosion and its prevention

Summary of Learning Outcomes

1. Analyse properties of engineering materials
2. Perform ore extraction processes
3. Produce iron materials
4. Produce alloy materials
5. Produce non-ferrous materials
6. Produce ceramics materials
7. Produce composite materials
8. Utilise other engineering materials
9. Perform heat treatment
10. Perform material testing
11. Prevent material corrosion

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Analyse properties of engineering materials	• Engineering materials is identified as per the procedures • Physical properties of engineering material • Mechanical properties of engineering materials	• Written tests • Oral questioning • Assignments • Supervised exercises

	• Crystal structure of materials	
2. Perform ore extraction processes	• Safety measures in metal extraction • Method of metal extraction • Procedure in metal extraction processes • Storing of metal Extraction by- products • Disposing extraction by-products	• Written tests • Oral questioning • Assignments • Supervised exercises
3. Produce iron materials	• Ore smelting processes. • Composition of iron • Method of producing iron material • Refinement processes	• Assignments • Oral questioning • Supervised exercises • Written tests
4. Produce alloy materials	• Tools and equipment for alloy production • Alloy formation process • Testing alloy products quality	• Assignments • Oral questioning • Practical tests • Observation • Supervised exercises • Written tests
5. Produce non-ferrous materials	• Extraction of Non-ferrous materials • Smelting and purifying of extracted non-ferrous material • Testing Non-ferrous material • Identifying Alloying elements for non-ferrous materials • Alloy formation process • Testing of Alloys for non-ferrous material	• Assignments • Supervised exercises • Written tests • Practical test
6. Produce ceramics materials	• Composition of ceramic materials • Manufacturing process for ceramics • Production of Ceramic materials • Finishing processes for ceramic materials	• Assignments • Supervised exercises • Written tests • Practical test
2. Produce composite materials	• Types of composites • Elements involve in composite formation	• Assignments • Supervised exercises • Written tests

	• Formation process of composites • Testing of composite materials	• Practical test
3. Utilise other engineering materials	• Identifying and selecting engineering materials • Developing operation plan • Setting up production machine • Setting production parameters • Production process for engineering materials	• Assignments • Supervised exercises • Written tests • Practical test
4. Perform heat treatment	• Safety practices procedures • Heat treatment processes • Procedure in heat treatment processes • Operations of heat treatment of metals	• Assignments • Supervised exercises • Written tests • Practical test
5. Perform material testing	• Material testing methods • Procedure of material testing • Analysing material testing results • Material testing equipment are taken care of and maintained.	• Assignments • Supervised exercises • Written tests • Practical test
6. Corrosion and its prevention	• Safety observation during corrosion prevention • Corrosion type is identified • Causes of corrosion • Methods of corrosion prevention • Corrosion prevention	• Assignments • Supervised exercises • Written tests • Practical test

Suggested Methods of Instruction

- Demonstration by trainer
- Discussions
- Practical work by trainee(s)
- Exercises
- Industrial visits
- YouTube for teaching/learning and inspiration
- Simulation

- Power point presentation

Recommended Resources

- Measuring tools and gauges
- Marking out tools
- Inspection tools and equipment
- Dressing tools
- Firefighting equipment
- PPEs –dust coat, dust masks, ear muffs, goggles
- First Aid kit
- Brooms and cleaning stuff
- Cleaning detergents
- Drawing papers

CORE UNITS OF LEARNING

TEXTILE TESTING

UNIT CODE: ENG/CU/TEX/CR/01/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Perform Textile Testing and Quality Control

Duration of Unit: 140 hours

Unit description

This unit describes the competencies required by a Textile technician to perform textile testing. It involves competencies required to test textile fibre, textile yarn, inspect grey fabric, test processed fabric and inspect finished fabric.

Summary of Learning Outcomes

1. Perform textile fibre testing
2. Perform textile yarn testing
3. Inspect grey fabric
4. Test processed fabric
5. Inspect finished fabric

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Perform textile fibre testing	• Sources of textile fibres • Textile fibres classification • Textile fibre properties • Fibre testing equipment • Fibre sampling methods • Fibre testing • Textile fibre reference standards • Documentation of testing results	• Practical test • Observation • Written tests • Oral questioning • Portfolio of evidence
2. Perform textile yarn testing	• Safety operations • Textile yarn testing equipment • Yarn testing equipment operation • Textile yarn properties • Yarn defects • Yarn testing	• Practical test • Observation • Written tests • Oral questioning • Portfolio of evidence

	• Textile yarn reference standards • Sampling methods • Documentation of testing results	
3. Inspect grey fabric	• Safety operations • Grey fabric testing equipment • Equipment operation • Grey fabric properties • Grey fabric defects • Fabric defect mending • Grey fabric grading ○ Documentation of inspection results	• Practical test • Observation • Written tests • Oral questioning • Portfolio of evidence
4. Test processed fabric	• Safety operations • Processed fabric testing equipment • Equipment operation • Processed fabric properties • Processed fabric defects • Processed fabric test • Processed fabric reference standards • Sampling methods • Documentation of testing results	• Practical test • Observation • Written tests • Oral questioning • Portfolio of evidence
5. Inspect finished fabric	• Safety operations • Finished fabric testing equipment • Equipment operation • Finished fabric properties • Finished fabric defects • Finished Fabric defect mending • Finished fabric grading • Finished fabric reference standards • Sampling methods • Documentation of inspection results	• Practical test • Observation • Written tests • Oral questioning • Portfolio of evidence

Suggested Methods of Instruction

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the Plants service and repair sector;
- Industrial visits.

Recommended Resources

- Fibre
- Yarn
- Fabrics
- Garment
- Evenness tester
- Finesse tester
- Tensile tester
- Abrasion tester
- Light fastness tester
- Perspiration tester
- Microscope
- Moisture meter
- Crease recovery
- Bending length
- Flame tester
- Comb sorter
- Fibrogragh
- Pressley index
- Twist counter
- Trash analyser
- Black board
- Tearing and bursting strength
- Acids
- Gravity tester
- Viscometer
- Spectrophotometer
- Alkalis
- Solvents

TEXTILE YARN PRODUCTION (SPINNING)

UNIT CODE: ENG/CU/TEX/CR/02/6/A

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Produce Textile Yarns

Duration of Unit: 150 hours

Unit Description
This unit describes the competencies required by a textile technician to produce textile yarns. It involves competencies required to produce blow room lap, carded sliver, draw frame sliver, sliver lap, combed sliver, textile roving, ring spun yarn, yarn winding operations, plied yarns, rotor spun yarn, continuous filament yarns and Control yarn production and quality parameters

Summary of Learning Outcomes

1. Produce blow room lap
2. Produce carded sliver
3. Produce draw frame sliver
4. Produce sliver lap
5. Produce combed sliver
6. Perform yarn winding, doubling and twisting
7. Produce rotor spun yarn
8. Produce continuous filament yarns.
9. Perform minor maintenance on spinning machines
10. Control yarn production and quality parameters

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Produce blow room lap	• Safety precautions in fibre blending/mixing • Methods of blending • Blow room machine • Textile fibre identification • Quality control in fibre blending/mixing • Blending ratios and calculations	• Oral questions • Observation • Practical test • Written tests
2. Produce carded sliver	• Carding machine • Carding production process • Carding machine operation	• Oral questions • Observation • Practical test

	• Carding process monitoring • Carding process defects • Waste management • Production management	• Written tests
3. Produce draw frame sliver	• Draw frame setting up • Draw frame production process • 3Draw frame operation • Drawing process monitoring • Drawing process defects • 3Slive frame waste management	• Oral questions • Observation • Practical test • Written tests
4. Produce sliver lap	• Lap forming machine • Sliver frame operation • Sliver lap forming process monitoring • Sliver lap forming process defects • Sliver waste management	• Oral questions • Observation • Practical test • Written tests
5. Produce textile roving	• Speed frame setting up • Operation of speed frame • Roving process monitoring • Roving process defects	• Oral questions • Observation • Practical test • Written tests
6. Produce ring spun yarn	• Rotor spun yarn properties • Rotor spinning machine • Process and quality control in rotor spinning • Fault identification and rectification • Rotor spinning monitoring	• Oral questions • Observation • Practical test • Written tests
7. Perform yarn winding operations	• Purpose of winding, plying and twisting • Plying, winding and twisting machines • Winding process parameters • Process and Quality control • Process defects and their correction • Plying, winding and twisting monitoring	• Oral questions • Observation • Practical test • Written tests
8. Produce rotor spun yarn	• Safety procedures • Maintenance tools • Adjustments • Waste removal • Lubrication points	• Oral questions • Observation • Practical test • Written tests

	• Cleaning points • Lubricants • Machine setting points	
9. Produce continuous filament yarns	• Safety procedures • Production specifications/schedule interpretation • Work implementation planning • Work allocation • Control of spinning resources to ensure smooth work flow • Machine monitoring points • Process fault identification • Process fault rectification • Waste sorting and disposal • Production and efficiency calculation • Process documentation	• Oral questions • Written tests • Observation • Assignments • Practical • Written report
10. Control yarn production and quality parameters	• Efficient production • Production efficiency is monitoring. • Production process control • Product process inspection • Process non-conformance	• Oral questions • Written tests • Observation • Assignments • Practical • Written report

Suggested Methods of Instruction

- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee

Recommended Resources

- Fibres
- Material handling equipment's
- Bale opener or Bale plucker
- Fibre cleaning machines
- Open fibre delivery systems
- Carding machine
- Drawing Frame
- Lap former
- Comber machine
- Simplex

- Ring Frame
- Rotor spinning machine
- Cone winding machine
- Yarn doubling and twisting machine
- Polymer extrusion machine
- Yarn texturizing machine
- Machine maintenance tools

WOVEN FABRIC PRODUCTION (WEAVING)

UNIT CODE: ENG/CU/TEX/CR/03/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce Woven Fabric

Duration of Unit: 160 hours

Unit description

This unit describes the competencies required by a textile technician to produce woven fabric. It involves competencies required to produce warp beam, sized beam, and drawn beams, set up weaving machine, operate weaving machines, control production and quality parameters

Summary of Learning Outcomes

1. Produce warp beam
2. Produce sized beam
3. Produce drawn beams
4. Set up weaving machine
5. Operate weaving machine
6. Control fabric preparation production and quality parameters

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Produce warp beam	• Workplace safety • Textile yarns • Warping machines • Warp patterning • Warping calculations • Warping machine set up • Warping machine operation • Warping faults and repair techniques • Warping machine monitoring	• Practical tests • Observation • Written tests • Oral questioning
2. Produce sized beam	• Workplace safety • Sizing machine • Size liquor preparation • Sizing machine set up	• Practical tests • Observation • Written tests • Oral questioning

	• Sizing machine operation • Sizing faults and remedies • Sizing waste control and disposal • Sizing operations control • Sizing machine monitoring	
3. Produce drawn beams	• Safety procedures • Textile yarns • Warp patterns • Heald frame selection and preparation • Drawing and denting tools and equipment • Drawing pattern notation • Warp drawing and denting • Quality control in drawing and denting • Operations control in warp drawing • Drawing process monitoring and control • Textile yarns • Beam handling equipment • Warp dressing • Warp knotting/tying machines • Knotting/tying machine operation • Knotting machine maintenance • Quality control in knotting • Loom pinning • Knotting process monitoring and control • Beam handling equipment • Warp pattern settings • Pattern cards punching • Weft pattern changes • Weft density changes • Loom pinning	• Practical tests • Observation • Written tests • Oral questioning

	• Beam gaiting process monitoring and control	
4. Set up weaving machine	• Safety procedures • Machine type • Setting points • Setting tools and equipment	• Practical tests • Observation • Written tests • Oral questioning
5. Operate weaving machine	• Safety procedures • Types of weaving machines • Weaving machine • Operation of weaving machines • Weaving faults and remedies • Maintenance and care of weaving machine • Weaving process monitoring and control	• Practical tests • Observation • Written tests • Oral questioning
6. Control fabric preparation production and quality parameters	• Safety procedures • Production specifications • Work implementation planning • Work allocation • Control of resources to ensure smooth work flow • Machine monitoring points • Process fault identification • Process fault rectification • Waste sorting and disposal • Production and efficiency calculation • Process documentation	• Practical tests • Observation • Written tests • Oral questioning

Suggested Methods of Instructions

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the Plants service and repair sector;
- Industrial visits.

Recommended Resources

- Warping machines
- Sizing machines
- Draw-in frame
- Heald frames
- Drawing and denting knives and hooks
- Warp tying/Knotting machine
- Warp beam carrying equipment
- Weaving machine
- Yarns on suitable packages
- Sizing chemicals
- Sizing cooking equipment
- Steam
- Weight bridge
- Droppers
- Reed
- Looms

FABRIC KNITTING

UNIT CODE: ENG/CU/TEX/CR/04/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce Knitted Fabric

Duration of Unit: 150 hours

Unit description

This unit describes the competencies required by a textile technician to produce knitted fabrics. It involves competencies required to produce warp beam, set up knitting machine, operate knitting machines and control knitted production and quality parameters.

Summary of Learning Outcomes

1. Produce warp beam
2. Set up knitting machine
3. Operate knitting machines
4. Control knitted production and quality parameters

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Set up knitting machines	• Safety precautions in knitting • Importance of knitting • Identification of knitting elements • Knitting yarn properties • Types of knitting machines • Properties of different knitting machines • Knitting principles • knitting needles • Knitting machine setting points • Knitting machine settings • Knitting machine parts	• Practical test • Observation • Written tests • Oral questioning

2. Produce warp beam	• Procedure for warping • Types of warping • Safety precautions in warping • Warp knitting machines • Warping efficiency • Warping faults and their remedies	• Practical test • Observation • Written test
3. Operate knitting machine	• Knitting machines • Construction of knitted fabric • Knitting machine operation • Knitting faults and their remedies • knitting process monitoring and control • Withdraw the roll fabric and weighing	• Practical • Observation • Written tests • Assignments • Written reports • Oral questioning
4. Control production and quality parameters	• knitting Production planning • knitting Quality management • knitting Maintenance management • knitting faults and their remedies	• Practical • Observation • Written exams • Assignments • Written reports • Oral interviews

Suggested Methods of Instruction

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the knitting sector;
- Industrial visits.

Recommended Resources

- Yarns
- Machine knitting elements
- Machines
- Specialised knitting tools

NONWOVEN FABRICS

UNIT CODE:ENG/CU/TEX/CR/05/6/A

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Produce Nonwoven Fabrics

Duration of Unit: 150 hours

Unit Description
This unit describes the competencies required by a textile technician to produce nonwoven fabric. It involves competencies required to produce laid fibre webs, produce bonded nonwoven fabrics, control production and quality parameters and producing finished nonwoven fabrics

Summary of Learning Outcomes
1. Produce laid fibre webs
2. Produce bonded nonwoven fabrics
3. Control production and quality parameters
4. Produce finished nonwoven fabrics

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Produce laid fiber webs	• Textile Fibre • Fibre preparation • Carding process • Operation and setting of carding machines • Web formation • Operation and setting of fibre laying machines • Fibre laying procedures • Fibre laying techniques • Web laying methods	• Oral questions • Written tests • Observation of trainees • Assignments • Practical's • Written report
2. Produce bonded nonwoven fabrics	• Bonding principles • Bonding methods • Setting and controlling of bonding parameters • Preparation of resin	• Oral questions • Written tests • Observation of trainees • Assignments • Practical

	• Operation and setting of Bonding machines • Bonding procedures • Bonding fault identification and rectification • Curing techniques	• Written report
3. Control production and quality parameters	• Controlling resin parameters • Defects in nonwoven fabrics and their remedies • Optimization of production process • Controlling fabric properties	• Oral questions • Written tests • Observation of trainees • Assignments • Practical • Written report
4. Produce Finished nonwoven fabric	• Ways of finishing nonwovens • Types of finishes • Purposes of finishing • Finishing of non-woven fabric • Non-woven finishing machines • Operation and setting procedures of nonwoven finishing machines • Finished nonwoven fabric process monitoring and control • Maintenance of nonwoven machines	• Oral questions • Written tests • Observation of trainees • Assignments • Practical • Written report

Suggested Delivery Instruction

- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos
- Visit to nonwoven fabric factory

Recommended Resources

- Fibres
- Resins and bonding chemicals
- Fabric
- Yarns
- Bonding machines

- Laying machines
- Curing and dyeing machines
- Finishing machines
- Cutting machines
- Heating equipment

TEXTILE WET PROCESSESING

UNIT CODE: ENG/CU/TEX/CR/06/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Process Textile Fabric

Duration of Unit: 150 hours

Unit description

This unit describes the competencies required by a textile technician to process textile fabric. It involves competencies required to perform textile pre-treatment, textile dyeing, textile printing and textile finishing, control production and quality parameters

Summary of Learning Outcomes

1. Perform textile pre-treatment
2. Perform textile dyeing
3. Perform textile printing
4. Perform textile finishing
5. Control production and quality parameters

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Perform textile pre-treatment	• Objectives of pre-treatment • Safety operations • Textile Chemical Processing for the Fibres • Pre-treatment machines • Pre-treatment processes • Singeing of fabric • Desizing • Scouring • Mercerizing • Bleaching • Pre-treatment procedures	• Practical • Observation • Written tests • Oral interviews
2. Perform textile dyeing	• Safety operations • Colouring Materials • Colour preparation	• Written tests • oral interview • presentations

	• Dyeing operation • Dyeing methods • Process control • Quality control	• practical • lab reports
3. Perform textile printing	• Safety operations • Printing Patterns • Printing Operations • Screen preparation • Process control • Quality control	• written tests • oral interview • presentations • practical • lab reports
4. Perform textile finishing	• Safety operations • Classification of Finishes • Finishing machinery • Finishing methods • Chemical finishing • Mechanical finishing • Heat setting finishing • Finishing process monitoring and control	• written tests • oral interview • presentations • practical • lab reports
5. Control production and quality parameters	• Properties of finished fabric • Control process parameters • Testing for conformity to quality	• Practical • Observation • Written tests • Oral interviews • Individual and group assignments • Projects and lab report • presentation

Suggested Methods of Instruction

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the Plants service and repair sector;
- Industrial visits.

Recommended Resources

- Fibres
- Yarns
- Fabrics
- Garments
- Grey inspection machine
- Shearing machine
- Singeing machine
- Desizing
- Scouring and washing
- Bleaching
- Mercerizing
- Dry and heat setting
- Desizing chemicals
- Scouring chemicals
- Bleaching chemicals
- Mercerizing chemicals
- Steam
- Screen preparation equipment
- Printing machines
- Photo Emulsion
- Clamp Hinges
- Rubber Gloves
- Heavy Duty Stapler
- Frame
- Scoop Coater
- Squeegee
- Screen Fabric
- Curing machines
- Washing machines
- Drying
- Print paste
- Screen mesh/ rotary/ stencil/ digital computers
- Textile chemicals finishing machines
- Stenter.

- Compactor.
- Dryer.
- Active Stabilizing Dryer.
- Slitter.
- Squeezer.
- Fabric Turning.
- Seuding.
- Dry finishing chemicals machines
- Chemicals required for finishing

PRODUCTION PROCESS MANAGEMENT

UNIT CODE: ENG/CU/TEX/CR/07/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Manage Textile Production Process

Duration of Unit: 100 hours

Unit description

This unit describes the competencies required by a textile technician to manage textile production process. It involves competencies required to set up production process, operationalize production process, maintain production targets, control stock utilization, oversee plant maintenance, maintain production records, manage storage of raw materials and production outputs, manage production rejects and manage safety operations

Summary of Learning Outcomes

1. Set up production process
2. Operationalize production process
3. Maintain production targets
4. Control raw materials utilization
5. Coordinate plant maintenance
6. Maintain production records
7. Manage storage of raw materials and production outputs
8. Manage production rejects
9. Manage safety operations
10. Manage sectional staff

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Set up production process	• Identification of products and raw materials. • Checking of raw materials. • Inspection of production machine. • Confirmation of labour availability. • Inspection of production lines • Safety	• Practical • Observation • Written • Oral

	• Testing of production line.	
2. Operationalize production process	• Adjusting production line settings. • Running of production line. • Checking of products against expected standards. • Identification and rectification of faults. • Arranging and packing of finished products. • Removing and securing of rejects.	• Observation • Written • Oral • Practical
3. Maintain production targets	• Setting of production targets. • Informing production personnel. • Assigning targets to personnel. • Follow up of set targets. • Reviewing of achieved targets. • Assessing and ascertaining of production targets. • Maintaining of records.	• Practical • Oral • Observation • Written
4. Control raw materials utilization	• Defining of raw material requirements. • Re-ordering of raw materials. • Maintaining raw material records.	• Practical • Oral • Observation • Written
5. Coordinate plant maintenance	• Routine inspections of machines • Planning of maintenance schedules • Availing of production machines for maintenance • Maintaining records	• Practical • Oral • Observation • Written
6. Maintain production records	• Identification of information and data. • Identification of data recording methods. • Recording of production information and data. • Generating production reports. • Processing and storage of records.	• Practical • Oral • Observation • Written

7. Manage storage of raw materials and production outputs	• Cleaning and maintaining of storage areas. • Special storage of hazardous and fragile materials and finished products. • Updating of storage records. • Inspection of raw materials and finished products.	• Practical • Oral • Observation • Written
8. Manage production rejects	• Maintenance of plant machinery. • Training of production staff. • Setting of production parameters. • Inspection of finished products • Isolation of rejects.	• Practical • Oral • Observation • Written
9. Manage safety operations	• Safety • Personal protective equipment • Daily safety inspections. • Safety signage • 5's implementation. • Conducting first aid operations. • Collecting personnel safety feedback. • Setting of safety goals • Reviewing of plant inspection report.	• Practical • Oral • Observation • Written
10. Manage sectional staff	• Planning and development of leave rota • Allocation of jobs. • Complying with set time schedules. • Resolution of Disputes. • Staff appraisal	• Practical • Oral • Observation • Written

Suggested Methods of Instruction

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the Plants service and repair sector;

- Industrial visits.

Recommended

- Workshop (electrical / mechanical / hydraulics
- Testing machines.
- Mechanical tool box.
- Stationery
- Protective gear
- Lifting equipment
- Printers
- Computers
- Data collection devices
- Calculators
- Storage facility.
- Lighting.
- First aid kits
- Production manuals.