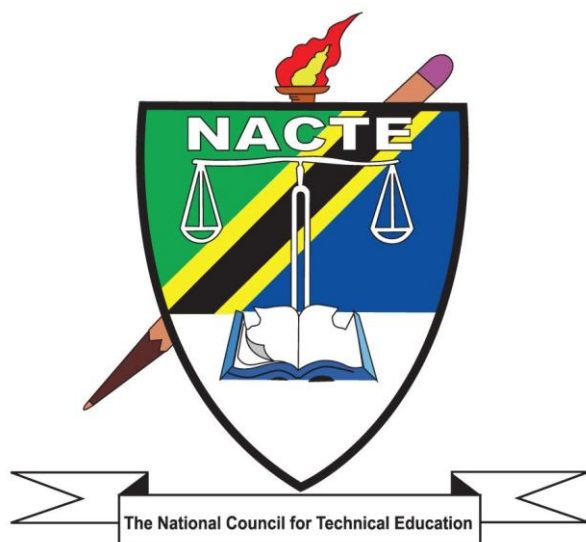


NATIONAL COUNCIL FOR TECHNICAL EDUCATION



NOVEMBER 2022

PROPOSED OCCUPATIONAL STANDARDS

FOR BIOPROCESS TECHNOLOGY

OCCUPATION: BIOPROCESS TECHNICIAN

LEVEL: NTA 4

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FOREWORD

The National Council for Technical Education (NACTE) is a corporate body established by the National Council for Technical Education Act, Cap.129. The Act provides a legal framework for the Council to coordinate the provision of technical education and training in Tanzania. The mandate of NACTE is three-fold, namely; Regulatory, Quality Assurance and Policy Advisory. In discharging its mandate, the Council has been charged with the responsibilities, among others, to:

- a) assist technical institutions in the transmission of knowledge, principles and training in the field of technical education and training for the benefit of the people of Tanzania;
- b) assist technical institutions in the overall development of the quality of education they provide and to promote and to maintain approved academic standards;
- c) establish and make awards in technical education which are consistent in standard and comparable to related awards in Tanzania and internationally; and
- d) ensure that the quality of education required for the awards is met and maintained throughout the duration of the delivery of the course.

In the course of execution of these responsibilities, the Council has been instituting various measures aiming at advancing the quality of training provided in technical institutions in respect of the changing demands of the labour market, both local and international.

To achieve the above obligation, NACTE, under the Ministry of Education, Science and Technology implemented the East Africa Skills for Transformation and Regional Integration Project (EASTRIP), a project aiming at promoting regional integration through supporting the regional corridors and sector markets, developing common standards and qualifications, and promoting mobility of students, faculty, and graduates. The project supports the Government of Tanzania to address shortage of skills in five sectors namely:

- (a) Energy;
- (b) Construction;
- (c) Information and Communication Technology (ICT);
- (d) Transportation; and
- (e) Agribusiness.

To address the skills, miss-match and shortage in the five (5) sectors in the country, the project funded, among others, a component of Development of Occupational Standards for Technical and Vocational Education and Training (TVET). In this regard, NACTE endeavoured to identify qualified and highly experienced experts in the five sectors from both the industry and training institutions to carry out the development of Occupational Standards. The exercise was carried out at Morogoro Teachers College – Morogoro from 27th August to 24th September, 2021. The output of the exercise is Occupational Standards for 14 occupations. Occupational standards for Bioprocess and Post-Harvest Engineer are among the occupational standards for 26 occupations which have been developed.

Since Occupational Standards are statements of work performance reflecting the ability to successfully complete the functions required in an occupation, as well as the application of knowledge, skills, attitudes and understanding in an occupation, it is the Council's expectations that the developed standards will form a robust base for decision making and provide explicit guidance to policy makers, curriculum developers, educators, employers and other stakeholders in matters related to manpower planning as well as execution of Technical and Vocational Education and Training undertakings.

Prof. J. W. Kondoro
Chairman

Dar es Salaam
NOVEMBER 2022

ACKNOWLEDGEMENT

The National Council for Technical Education (NACTE) is charged with the mandate to be the Quality Assurance organ of the Government in matters related to Technical and Vocational Education and Training (TVET) and production of qualified manpower for both local and international labour markets. In order to realize this obligation, NACTE endeavours to institute policies, guidelines and standards and to set the quality benchmarks for training institutions.

However, this is only possible if there is a strong base, linking the training institutions on one hand and the demands of the industry/labour market for relevant manpower on the other hand. Therefore, the Council undertook a step to develop Occupational Standards in sectors considered to be the engine to steer the country's desire to achieve an industrial economy. This exercise would not be a success without the input and support from our stakeholders. I am indebted to acknowledge some of them here.

I wish to acknowledge and appreciate the support from the Ministry of Education, Science and Technology through the East Africa Skills for Transformation and Regional Integration Project (EASTRIP) for the financial support which facilitated the preparation of this document. I wish also to appreciate Mrs Leah Lukindo and Eng. Dr. Simon Baregu for the tireless efforts and commitment in facilitating and guiding the standards development process, Ms. Eileen Tzamburakis and Ms. ChausikuYakweli Ibrahim for compiling and typesetting the final document; and the NACTE Secretariat for coordinating the whole activity.

In a very special way I wish further to extend my sincere gratitude to this team of wonderful experts who tirelessly dedicated their time and availed their invaluable intellect in the preparation of this document. I would like to recognize the colossal inputs of the following experts:

S/N	Name	Designation	Organization
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2.	Eng. Sharif Mwangi	Head of Unit Leather	Dar es Institute of Technology (DIT) - Mwanza

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		Processing (TA)	
3.	Eng. Mahmoud Bashemela	Supervisor	Pyxus Agriculture Tanzania
4.	Eng. Susan A. Mbacho	Tutorial Assistant	Sokoine University of Agriculture (SUA)

In addition, NACTE hopes to further enhance the internationalization of occupational standards and promote the modernization and internationalization of industries, facilitating Tanzania's integration into the international market and exploiting its development potential. Therefore, NACTE has invited China-Africa Vocational Education Alliance and China-Africa (Chongqing) Vocational Education Alliance to participate in the development, revision and review of occupational standards documents in collaboration with Chinese vocational institutions, so as to make use of their rich experience in vocational education efforts and rely on China's advanced and complete industrial chain and its position in the international market to contribute to the development of vocational education and related industries in Tanzania.

Therefore, I would like to express my sincere gratitude to this specialized team of Chinese institutions and experts. I thank them for their hard work and dedication, and for contributing their wisdom and experience to the preparation of this document. I would like to thank the following institutions and experts for their support:

<u>S/N</u>	Institute	Name	Title/ Professional Field
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2		Yang Xiaohui	Associate Professor/Pharmaceutical Biotechnology
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ABBREVIATIONS

AP	Agricultural Produce
FIFO	First In First Out
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis and Critical Control Point
KPIs	Key Performance Indicators
NACTE	National Council for Technical Education
NOS	National Occupational Standards
OS	Occupational Standards
OSHA	Occupational Safety and Health Agency
SOPs	Standard Operating Procedures
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training

GLOSSARY OF TERMS

Circumstantial knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues
Competence:	The ability to use knowledge, understanding, practical and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based education:	An instructional program that derives its content from validated tasks and bases assessment on the learner's performance
Curriculum:	A description or composite of statements about “what is to be learned” by the trainee/student in a particular instructional programme; a product that states the “intended learning outcomes”.
Educational/training programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational analysis:	A process used to identify the tasks that are important to employees in any given occupation
Occupational area:	This is a broad grouping of related jobs. Example: food service
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including

knowledge and relevant attitudes. They also act as performance tool of assessment of the pre – scribed outcomes.

Performance criteria:	Indicate the expected end results or outcome in form of evaluative statements.
Skills:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.
Standards:	it is a set of statement, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance
Task analysis:	The process of analysing each task to determine the steps, related knowledge, attitudes, performance standards, tools and materials needed, and safety concerns required of employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, consists of two or more definite steps, and leads to a product, service, or decision.
Underpinning Knowledge:	This is crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification process:	The process of having experts review and conform the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.
Occupational Competence:	The application of knowledge and skills to perform

consistently to the standards required in the work context.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's Development Vision 2025 intends to raise the country's economy to a middle-income status. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical Education has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the labour market and the country's economic agenda.

National Occupational Standards (NOS) are performance criteria that are matched with labour market demands. Each National Occupation Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current and consistent in delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training standards/qualifications standards are different. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical wiring circuits, performs trouble shooting in electrical wiring, etc.) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the occupational standards and the training standards to respond to demands of the labour market.

In TET delivery, Tanzania adopted the Competence-based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational standards are thus the starting point for developing Competence-based Education and Training (CBET) programs. TET

institutions will be required to benchmark their curricula with relevant occupational standards.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training (TET).

The Bioprocess Technician Occupation has its own set of occupational standards. The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The Occupational standards development process began with an examination of major documents that guide Tanzanian skill development. The 10-year National Skills Development Strategy (2016-2026) was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes. These sectors include: Transport and logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a workshop comprised of expert workers and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as **Appendix 1** to this document.

The workshop thereafter continued with the development of occupational standards. Experts in Occupational Analysis and Occupational Standards Development facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the occupational standards. Bio - processing and Post-harvest Engineers, supervisory technicians on the job, and experienced experts in Bio-processing were key informants in the survey to establish occupational trends. This information was used to gain insight from the workplaces regarding trends and changes in the profession, including how well graduates are equipped for working in the occupation. A total of online surveys were completed by experts from the labour market across the country. Apart from the survey aiding in defining the scope for the occupational analysis, they served to engage a wide cross-section of experts in the

occupation. The stakeholders' forum was attended by participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR BIOPROCESS TECHNICIAN

The Bioprocess technician plays an important role in areas like agricultural produce collection, transport, storage and processing. Bioprocessing technicians operate equipment, measure chemicals and formulate complex products, among other tasks. Bio process Technicians are involved at all stages of a manufacturing process. The role requires individuals to follow strict internal protocols and Standard Operating Procedures (SOPs) as well as following current Good Manufacturing Practices (cGMP). The standard covers the main duties of Bioprocess technician as follows:

- a) Implement safety measures at work place
- b) Perform Quality Test of the received Agricultural Produce (AP) from Farmers /Agro Dealers
- c) Conduct preventive maintenance of processing AP machines
- d) Supervise production operations of AP
- e) Prepare packaging materials of a processed AP
- f) Conduct quality test of the finished product
- g) Design packaging of a processed AP
- h) Monitor waste produced in production line.
- i) Create business of the processed AP

The Occupational standards have been clustered into NTA qualification levels i.e. NTA levels 4, 5 and 6.

4.0. VALIDITY PERIOD

The occupational standards will be valid for 3-5 years due to the fast-changing nature of technology. The review will proceed in the same manner as the previous one, with new occupational standards being developed based on current labour market information.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR BIOPROCESS TECHNOLOGY TECHNICIAN - LEVEL 4

OCCUPATION	BIOPROCESS TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	IMPLEMENT SAFETY & HEALTH MEASURES AT WORK PLACE	DUTY NO.	401
TASK TITLE	APPLY HACCP TO MANAGE AP SAFETY	TASK NO	4011
PERFORMANCE CRITERIA	The person performing this task must be able to apply knowledge and skills to apply HACCP to manage safety of products as per approved standards and procedures.		
RANGE STATEMENT	The task will be performed in office under the supervision of an Engineer. The following equipment, tools and materials will be needed in performing the task: PPEs, cleaning aids and equipment (brushes, brooms apron, plastic shovels,etc.), detergents, computer, printers, calculator, stationery.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Prepare right tools and equipment to perform the task; 2. Interpret HACCP Plan; 3. Identify the HACCP team; 4. Identify product and its distribution; 5. Identify the intended use and consumers of the product; 6. Obtain flow diagram which describes the process; 7. Verify the flow diagram; 8. Carry out hazard analysis of the product; 9. Establish critical control points (CCPs) ; 10. Establish critical limits; 11. Establish monitoring procedures; 12. Establish corrective actions; 13. Follow verification procedures; 14. Keep record and documentation; 15. Clean tools, equipment and working environment; 16. Observe safety and health rules and regulations.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Develop HACCP plan; 1.2. Interpret flow diagrams. 2.0. Principles The person must be able to explain the principles of: 2.1. Compliance of work safety with laws and regulations, GMP; 2.2. Plant safety and health regulations. 3.0. Theories The person must be able to explain: 3.1. Safety of product; 3.2. Standard operating procedures; 3.3. Quality Control (QC) ; 3.4. Quality Assurance (QA) ; 3.5. HACCP. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Self-awareness;	

	4.4. Self-discipline; 4.5. Critical thinking; 4.6. Integrity; 4.7. Time management; 4.8. Commitment; 4.9. Curiosity.
DESCRIPTION OF THE END PRODUCTS / SERVICE	Safety of product is conducted by applying HACCP as per approved standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe handling of equipment and tools; 2. HACCP rules and regulation; 3. Extent of responsibility; 4. Occupational safety and health.

OCCUPATION	BIOPROCESS TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	IMPLEMENT SAFETY & HEALTH MEASURES AT WORK PLACE	DUTY NO.	401
TASK TITLE	APPLY GMPs TO MAINTAIN SAFETY IN PREMISES	TASK NO.	4012
PERFORMANCE CRITERIA	The person performing this task must be able to apply knowledge and skills to apply GMPs to maintain safety in premises as per approved standards and procedures.		
RANGE STATEMENT	The task will be performed in the premises under the supervision of an Engineer. The following equipment, tools and materials will be needed in performing the task: computer, printers, calculator, stationery, ppes, cleaning aids (brushes, brooms apron, plastic shovels), detergents, engineering tool box and safety facilities.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Interpret GMPs Plan; 2. Identify the GMPs team; 3. Perform cleaning of the premises; 4. Perform maintenance of the premises; 5. Minimize build-up of dirt and dust; 6. Eliminate any adverse effects on premises; 7. Identify fire assembly points; 8. Locate safe emergency exits; 9. Locate fire extinguisher and first aid kit; 10. Observe adequate security arrangement; 11. Identify sanitation system and waste disposal areas; 12. Identify clean water system; 13. Observe maintenance procedures; 14. Keep record and documentation.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Conduct GMPs; 1.2. Maintain premises. 2.0. Principles The person must be able to explain the principles of: 2.1. GMP; 2.2. HACCP; 2.3. Complete safety facilities; 2.4. Concern about occupational health; 2.5. Maintenance of guard devices, safety devices and signal indicator devices. 3.0. Theories: The person must be able to explain: 3.1. Standard layout of the plant; 3.2. House keeping; 3.3. Sanitation systems. 4.0. Essential skills 4.1. Teamwork skills; 4.2. Communication skills; 4.3. Self-awareness;	

	4.4. Self-discipline; 4.5. Critical thinking; 4.6. Integrity; 4.7. Problem solving; 4.8. Time management; 4.9. Commitment.
DESCRIPTION OF THE END PRODUCTS / SERVICES	Safety of premises by applying GMPs is maintained as per approved standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe handling of equipment and tools; 2. GMPs rules and regulation; 3. Extent of responsibility; 4. Occupational safety and health.

OCCUPATION	BIOPROCESS TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	IMPLEMENT SAFETY & HEALTH MEASURES AT WORK PLACE	DUTY NO.	401
TASK TITLE	PRACTICE HEALTH & SAFETY MEASURES AT WORK PLACE	TASK NO.	4013
PERFORMANCE CRITERIA	The person performing this task must be able to practice health & safety measures at work place as per approved standards and procedures.		
RANGE STATEMENT	The task will be performed in work place under the supervision of an Engineer. The following equipment, tools and materials will be needed in performing the task: Computer, Printers, Calculator, stationery, PPEs, fire extinguisher, first aid kit, safety signs, etc.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Observe hazard identification and risk assessment procedures; 2. Identify occupational diseases; 3. Apply corrective measures to prevent occupational diseases; 4. Wear personal protective equipment (ppes) accordingly; 5. Identify all hazardous materials in the work environment; 6. Conduct hazardous material storage and handling; 7. Obtain the safety data sheet for each chemical; 8. Identify emergency evacuation procedures; 9. Mark the location of storage area; 10. Keep flammable materials away from ignition sources; 11. Observe fire safety procedures; 12. Practice housekeeping procedures; 13. Locate first aid kit at workplace; 14. Establish evacuation procedures;		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Wear PPEs; 1.2. Extinguish fire. 2.0. Principles The person must be able to explain the principles of: 4.1. Open fire; 4.2. Friction and impact; 4.3. High-temperature surface; 4.4. Electrical sparks; 4.5. Electrostatic sparks; 4.6. Chemical reaction heat; 4.7. Exposure to light. 3.0. Theories The person must be able to explain: 3.1. Fire classification; 3.2. Extinguishing methods; 3.3. Standard operating procedures (SOPs) ; 3.4. Safety rules. 4.0. Essential skills 4.1. Teamwork skills;	

15. Identify emergency exits and stations; 16. Participate in workers' orientation and training; 17. Maintain health of workers; 18. Complete forms, records and others documentation for health & safety measures; 19. Observe safety and health rules and regulations.	4.2. Communication skills; 4.3. Entrepreneurship skills; 4.4. Budgeting skills; 4.5. Self-awareness; 4.6. Self-discipline; 4.7. Critical thinking; 4.8. Integrity; 4.9. Problem solving; 4.10. Time management; 4.11. Commitment.
DESCRIPTION OF THE END PRODUCTS /SERVICES	Health & safety measures at work place are practiced as per approved standard and procedures.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe handling of equipment and tools; 2. HACCP rules and regulation; 3. Extent of responsibility; 4. Occupational safety and health.

OCCUPATION	BIOPROCESS TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONDUCT QUALITY TESTS OF RECEIVED AP FROM FARMERS/AGRO- DEALERS	DUTY NO.	402
TASK TITLE	PREPARE SAMPLE OF RECEIVED AP FOR LABORATORY PROCEDURES	TASK NO.	4021
PERFORMANCE CRITERIA	The person carrying out this task must be able to apply knowledge and skills to prepare sample from received AP from farmers/agro-dealers for laboratory procedures of as per approved standards and procedures.		
RANGE STATEMENT	The task will be performed in the premises under minimum supervision of an Engineer. The following equipment, tools and materials will be needed in performing the task: probes, weigh balance, computer, stationery, PPE’s coveralls, containers.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Obtain the required materials, tools and equipment needed for sampling process; 2. Identify characteristics of AP to be sampled; 3. Establish proper sampling method; 4. Take sample of AP for quality test; 5. Record vehicle’s number that sample has been taken from; 6. Take sample to the laboratory for quality test; 7. Complete forms, records and other documentations; 8. Observe safety and health when performing the task; 9. Clean tools, equipment and working environment; 10. Store tools and equipment after completing the task.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Take sample of AP; 1.2 Handle sample of AP; 1.3 Select sampling equipment. 2.0 Principles The person must be able to explain the principles of: 2.1 Sampling; 2.2 GMPs; 2.3 HACCP. 3.0 Theories: The person must be able to explain: 3.1 Sampling procedures; 3.2 Characteristics of AP; 3.3 Statistics. 4.0. Essential skills 4.1 Teamwork skills; 4.2 Computer skills; 4.3 Curiosity; 4.4 Communication skills; 4.5 Integrity;	

	4.6 Measurement and units; 4.7 Commitment.
DESCRIPTION OF THE END PRODUCTS / SERVICES	Sample of received AP is prepared for quality procedures as per standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe handling of equipment and tools; 2. ISO standard; 3. National standard; 4. Extent of responsibility; 5. Occupational safety and health.

OCCUPATION	BIOPROCESS TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONDUCT QUALITY TESTS OF THE RECEIVED AP FROM FARMERS/AGRO-DEALERS	DUTY NO.	402
TASK TITLE	PERFORM QUALITY TESTS OF RECEIVED AP FROM FARMERS/AGRO-DEALERS	TASK NO.	4022
PERFORMANCE CRITERIA	The person performing this task must be able to perform quality tests of received AP from farmers/agro-dealers as per standards and procedures.		
RANGE STATEMENT	The task will be performed at premises under supervision of an Engineer. The following equipment, tools and materials will be needed in performing the task: - PPEs, computers, stationery, moisture meter, containers, weigh balance, sieves,		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Prepare tools, equipment and materials to be used; 2. Obtain samples to be tested; 3. Identify characteristics of AP to be tested; 4. Measure moisture content of AP; 5. Locate foreign matters in the AP; 6. Identify inorganic matters in AP; 7. Identify damaged AP; 8. Identify rotten and diseased AP; 9. Identify discoloured AP; 10. Identify immature and shrivelled AP; 11. Record weight of each parameter; 12. Calculate the percentage of each parameter; 13. Verify the obtained percentage with the standards; 14. Complete forms, records and other documentations; 15. Observe health and safety when		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Handle sample of AP; 1.2. Obtain weight; 1.3. Calculate percentage; 1.4. Measure MC of AP. 2.0. Principle The person must be able to explain the principles of: 2.1. GMP; 2.2. HACCP; 2.3. SOPs; 2.4. Sampling. 3.0. Theories The person must be able to explain: 3.1. Properties of Agricultural produce; 3.2. Weighted utility additive theory; 3.3. Quality test of AP. 4.0. Essential skills 4.1. Teamwork skills; 4.2. Basic mathematics; 4.3. Measurements and units; 4.4. Communication skills; 4.5. Integrity; 4.6. Curiosity;	

performing the task; 16. Clean working tools and equipment; 17. Keep the working area clean and organized; 18. Store tools and equipment after completing the task.	4.7. Computer skills; 4.8. Problem solving skills; 4.9. Analytical skills.
DESCRIPTION OF THE END PRODUCTS / SERVICES	Quality test of received AP from farmers/agro-dealers is performed as per standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe handling of equipment and tools; 2. Extent of responsibility; 3. Material handling; 4. Good manufacturing practices; 5. Occupational safety and health; 6. House keeping.

OCCUPATION	BIOPROCESS TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONDUCT QUALITY TESTS OF RECEIVED AP FROM FARMERS/AGRO-DEALERS	DUTY NO.	402
TASK TITLE	PREPARE REPORT FOR RECEIVED AP FROM FARMERS/AGRO-DEALERS	TASK NO.	4023
PERFORMANCE CRITERIA	The person performing this task must be able to apply knowledge and skills to prepare report for received AP from farmers/agro-dealers as per given standards and procedures		
RANGE STATEMENT	The task will be performed at premises under supervision of an Engineer. The following tools, equipment and safety gear will be needed to accomplish this task: Standards manuals, forms, computer, stationery, printer.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Prepare tools, equipment and materials to be used; 2. Identify type of received AP; 3. Record vehicle’s number; 4. Record name of farmer/agro-dealer; 5. Record net weight of the received AP; 6. Record results of quality test for each parameter; 7. Document verification statements; 8. Observe health and safety when performing the task; 9. Clean working tools and equipment; 10. Keep the working area clean and organized; 11. Store tools and equipment after completing the task.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1 Write report document; 1.2 Use excels software; 1.3 Execute a Standard Operating Procedure. 2.0. Principle The person must be able to explain the principles of: 2.1 Accountability; 2.2 Transparency; 2.3 GMPs; 2.4 SOPs. 3.0. Theories The person must be able to explain: 3.1 Records Continuum theory; 3.2 Record management theory; 3.3 Accounting records. 4.0. Essential skills 4.1 Teamwork; 4.2 Communication skills; 4.3 Analytical skills; 4.4 Result oriented way of working; 4.5 Report writing skills;	

	4.6 Curiosity; 4.7 Commitment; 4.8 Time management; 4.9 Attention to details.
DESCRIPTION OF THE END PRODUCTS / SERVICES	Report for received AP from farmers/agro-dealers is prepared as per standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Standard Operation Procedure; 2. ISO standards on packaging test; 3. National Standards (TBS) ; 4. Handling of equipment and tools; 5. Occupational safety and health; 6. Statistics.

OCCUPATION	BIOPROCESS TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONDUCT PREVENTIVE MAINTENANCE OF AP PROCESSING MACHINE	DUTY NO.	403
TASK TITLE	INSPECT AP PROCESSING MACHINE	TASK NO.	4031
PERFORMANCE CRITERIA	The person performing this task must be able to inspect AP processing machine as per standards and procedures.		
RANGE STATEMENT	The task will be performed at the factory under the supervision of Engineer. The following equipment, tools and materials will be needed in performing the task: Computer, stationery, diagnosing tools, flash light, measuring devices (tape measure, yardstick, callipers), weigh bridge, air gauges, pressure gauges, thermometers, temperature sensor, logs, forms.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Select tools, equipment and safety gear; 2. Revisit previous maintenance checklist; 3. Check machine parts against manufacturer’s recommendation; 4. Investigate abnormal sound of AP machines; 5. Check safety function systems of AP processing machine; 6. Check lubricant of AP machine; 7. Check loose bolts and nuts of AP machines; 8. Check control panels to identify issues; 9. Check electrical connections in processing machine; 10. Determine efficiency of AP processing machines; 11. Establish defective tools or equipment; 12. Clear faults on the AP processing machine Complete forms, records and other		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Carry out inspection; 1.2. Obtain tools, equipment and materials for inspection; 1.3. Fill inspection checklist. 2.0. Principles The person must be able to explain the principles of: conducting preventive maintenance. 3.0. Theories The person must be able to explain: 3.1. Type of AP Processing machine, their parts and functions; 3.2. Maintenance theory reliability; 3.3. Electricity fundamentals; 3.4. Effective maintenance. 4.0. Essential skills 4.1. Teamwork skills; 4.2. Communication skills; 4.3. Self-awareness; 4.4. Self-discipline;	

documentations; 13. Observe safety and health rules and regulations; 14. Clean tools and equipment; 15. Store tools and equipment in appropriate place; 16. Keep the working area clean	4.5. Critical thinking; 4.6. Integrity; 4.7. Problem solving; 4.8. Time management; 4.9. Commitment; 4.10. Curiosity; 4.11. Attention to details; 4.12. measurement and units; 4.13. Computer skills.
DESCRIPTION OF THE END PRODUCTS/SERVICES	AP processing machine is inspected as per approved standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe handling of equipment and tools; 2. Maintenance guidelines; 3. Extent of responsibility; 4. Occupational safety and health.

OCCUPATION	BIOPROCESS TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONDUCT PREVENTIVE MAINTENANCE OF AP PROCESSING MACHINE	DUTY NO.	403
TASK TITLE	PERFORM PREVENTIVE MAINTENANCE OF AP PROCESSING MACHINE	TASK NO.	4032
PERFORMANCE CRITERIA	The person performing this task must be able to perform preventive maintenance of AP processing machine as per standards and procedures.		
RANGE STATEMENT	The task will be performed at the factory under the supervision of an Engineer. The following equipment, tools and materials will be needed in performing the task: PPEs, Engineering Toolkit, lubricants, computer, operational manuals.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Obtain inspection checklist for maintenance; 2. Prepare materials, tools and equipment to perform task; 3. Clean machine parts of AP processing machines; 4. Lubricate moving parts of AP processing machines; 5. Fix loose bolts and nuts of AP machines; 6. Perform minor repairs of AP processing machine based on manufacturer guidelines; 7. Observe safety and health rules and regulations; 8. Keep record of conducted preventive maintenance of AP processing machines; 9. Clean working tools and equipment; 10. Store tools and equipment in appropriate place; 11. Clean the working place.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Carry out maintenance; 1.2. Assemble and disassemble machine; 1.3. Apply lubricant. 2.0. Principles The person must be able to explain the principles of: 2.1. Preventive maintenance; 2.2. Effective maintenance; 2.3. Machine. 3.0. Theories The person must be able to explain: 3.1. Lubrication; 3.2. Maintenance theory of reliability; 3.3. Current Electricity; 3.4. Work flow. 4.0. Essential skills 4.1. Teamwork skills; 4.2. Communication skills; 4.3. Self-awareness; 4.4. Self-discipline;	

	4.5. Critical thinking; 4.6. Integrity; 4.7. Problem solving; 4.8. Time management; 4.9. Commitment; 4.10. Measurement and units.
DESCRIPTION OF THE END PRODUCTS /SERVICES	Preventive maintenance of AP processing machine is performed as per approved standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe handling of equipment and tools; 2. GMPs rules and regulation; 3. Extent of responsibility; 4. Occupational safety and health.

OCCUPATION	BIOPROCESS TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONDUCT PREVENTIVE MAINTENANCE OF AP PROCESSING MACHINE	DUTY NO.	403
TASK TITLE	MONITOR WORKABILITY OF AP PROCESSING MACHINE	TASK NO	4033
PERFORMANCE CRITERIA	The person performing this task must be able to monitor workability of AP processing machine as per standards and procedures.		
RANGE STATEMENT	The task will be performed at the factory under the supervision of an Engineer. The following equipment, tools and materials will be needed in performing the task: Computer, PPEs.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Select tools, equipment and safety gear; 2. Observe workability of the machines as per manufacturer standards; 3. Gather information on workability of AP processing machine; 4. Record the Machine Downtime; 5. Operate the machine according to manufacturer’s standards; 6. Report any technical problem to a superior; 7. Record the status of the AP processing machine; 8. Complete forms, records and others documentations; 9. Clean tools and equipment; 10. Clean working place; 11. Store tools and equipment at appropriate place; 12. Observe safety and health rules and regulations.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Use operation manuals; 1.2. Gather information on machine workability; 1.3. Operate AP processing machine. 2.0. Principles The person must be able to explain the principles of: 4.1. GMP; 4.2. HACCP; 4.3. SOPs; 4.4. Preventive maintenance; 4.5. Effective maintenance. 3.0. Theories The person must be able to explain: 3.1. Workability theory; 3.2. Current electricity; 3.3. Record management theory. 4.0. Essential skills 4.1. Teamwork skills; 4.2. Communication skills; 4.3. Self-awareness; 4.4. Self-discipline; 4.5. Critical thinking; 4.6. Integrity;	

	4.7. Problem solving; 4.8. Time management; 4.9. Commitment; 4.10. Curiosity; 4.11. Attention to details.
DESCRIPTION OF THE END PRODUCTS / SERVICES	Workability of AP processing machine is monitored as per as per approved standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe handling of equipment and tools; 2. HACCP rules and regulation; 3. Extent of responsibility; 4. Occupational safety and health.

TABLE 1: DACUM CHARTS FOR BIOPROCESS TECHNICIAN – LEVEL 4

DUTIES	TASK	ENABLERS
1.0. Implement safety measures at work place	1.1. Apply HACCP to manage AP safety. 1.2. Apply GMPs to maintain safety in premises. 1.3. Practice health and safety measures at work place.	General knowledge and skills • Time management • Organization skills • GMPs and HACCP knowledge • Hazard material handling • Aseptic technique • Use of PPE Tools and Equipment • PPEs e.g., gloves, glassware, safety boot, shield etc. • First Aid kit Workers' behaviour • Apply standards according to guidelines • Team work • Commitment
2.0. Conduct Quality Test of received Agricultural Produce (AP) from Farmers /Agro Dealers	2.1. Prepare sample of received AP for laboratory procedures. 2.2. Perform quality tests of received AP from farmers/Agro-dealers. 2.3. Prepare report for received AP from farmers/agro-dealers.	General skills and knowledge • Sampling procedure • Basic lab technique skills • Report writing Tools and equipment • Moisture meter • Weigh balance • Spectrophotometer • Sample probes • Toolbox • Stationaries Materials • Chemical reagent

DUTIES	TASK	ENABLERS
		Worker's behaviour • Commitment • Trustworthy
3.0. Conduct preventive maintenance of AP processing machine	3.1. Inspect AP processing machine. 3.2. Perform preventive maintenance of AP processing machine. 3.3. Monitor workability of AP processing machine.	General skills and knowledge • Technical aptitude • Basic mechanical skills • Basic skills interpreting engineering drawing • Computer skills Tools and equipment • Engineer toolbox • Manufacturer manual Materials • Lubricant Worker's behaviour • Commitment • Trustworthy • Teamwork • Practice good housekeeping