BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS				
QUALIFICATION DEVELOPER (S)	FM-AMETS (Pty) Ltd T/A Aviation Academy Flying Mission				
TITLE	Diploma in Aircraft Maintenance Engineering			**NCQF LEVEL**	6
STRANDS (where applicable)	Not applicable				
FIELD	Manufacturing, Engineering and Technology	**SUB-FIELD**	Engineering and Engineering Trades	**CREDIT VALUE**	371

New Qualification												*Legacy Qualification*		√			
SUB-FRAMEWORK	*General Education*				*TVET*						*Higher Education*						
QUALIFICATION TYPE	*Certificate*	*I*		*II*		*III*		*IV*		*V*		*Diploma*	√	*Bachelor*			
	Bachelor Honours				*Post Graduate Certificate*						*Post Graduate Diploma*						
	Masters										*Doctorate/ PhD*						

RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE: The aviation industry in Botswana is faced with challenges arising from the dire need for qualified aircraft maintenance engineers, technicians, and artisans. Human resource in the aviation industry continues to be in high demand as the HRDC report 2016 identifies aircraft maintenance technicians as one of the priorities to be catered for.

In the mid-1990s, Flying Mission, the sole owner of FM-AMETS (Pty) Ltd, made efforts to send its apprentices out of the country for approved courses in aircraft maintenance engineering training. The approach did not yield the desired results, as in most cases, there were gaps in the knowledge and skills brought back to Botswana by the returning trainees. As a result, Flying Mission established FM-AMETS (Pty) Ltd to address the skills gap in the aviation industry. The Tertiary Education Council (TEC) and the Department of Civil Aviation (DCA) played a major role towards achieving this objective. So far, FM-AMETS is the only institution of this kind in Botswana that trains Aircraft Maintenance Engineers.

At this point, it is important to note that the government of Botswana spent a lot of resources training Aerospace and Aeronautical Engineers abroad. These training fields deal specifically with Aircraft Design, Metallurgy, and manufacturing of aircraft components. Upon returning to Botswana, these graduates could not perfectly fit in the field of aircraft maintenance and required retraining in the aircraft

maintenance field. However, the FM-AMETS programme directly addresses aircraft maintenance and reduces the exorbitant training costs associated with training the same programme abroad.

Further, a survey conducted by FM-AMETS revealed that the demand for aircraft maintenance engineers, technicians as well as artisans is high the world over, Botswana included, as indicated by the absorption of graduates in the aviation industry immediately after graduation. The following organisations and companies continue to absorb FM-AMETS graduates, Air Botswana, Kalahari Air Services, Major Blue Air, Northern Air Maintenance, Helicopter Horizon, Absolute Air Services, Northwest Air, Botswana Defence Force Air Arm, Botswana Police Service Air Support Unit and Civil Aviation Authority of Botswana. In these organisations, the graduates have been hired as Aircraft Technicians, Aircraft Mechanics, Aircraft engineers, Safety Officers, Maintenance Planning Officers, Aircraft Documentation Managers, Airworthiness Inspectors as well and Quality Assurance Officers.

The training programme is further supported by the National Development Plan (NDB 11) under Transport Subsector, which states that International Civil Aviation Organization (ICAO) has raised significant safety concerns through CAAB Audits, which have resulted in the country being blacklisted. Though the issue was mitigated, training of qualified personnel is necessary to avoid the recurrence of such concerns. The same report indicates that Air Botswana, a renowned Air Operation Certificate (AOC) holder in Botswana with a credible Approved Maintenance Organization (AMO), has an ageing fleet; the solution to this problem is twofold. A new fleet of airplanes can be acquired, and this will, therefore, require skilled personnel to maintain the fleet. Alternatively, the old fleet requires high-level maintenance, which requires skilled personnel as well. Other AMO's experience the same fate as the case referenced above and therefore the need to train more personnel in aircraft maintenance engineering.

Additionally, according to the Vision 2036 document, Botswana will be developed into a transport corridor connecting people and services with the rest of the world. This development heightens the need for skilled personnel in the transport and logistics sector, which includes aviation practitioners.

The support to the tourism sector, which contributes immensely to the local economy, requires participation from the aviation industry, particularly aircraft maintenance engineering, which provides the requisite impetus to the industry and, therefore, the need to have well-trained and skilled personnel.

PURPOSE: (itemise exit level outcomes)

The purpose of this qualification is to equip graduates with advanced knowledge, skills and competencies to:

- Interpret Aviation Regulations in order to facilitate compliance with Aviation Statutes.
- Maintain, inspect and repair aircraft and its associated components in accordance with requisite Aircraft Maintenance Manuals and Documents
- Restore the aircraft to the airworthy condition in accordance with Civil Aviation Authority of Botswana (CAAB) Rules and Regulations as well as other relevant local and international standards and recommended maintenance practices.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

Candidates must meet the following eligibility requirements:

- NCQF level 4 certificate IV with a minimum of a Credit in Physics, Mathematics and English
- Mature entrants with RPL and CAT are considered on merit as per ETP regulations.

SECTION B	QUALIFICATION SPECIFICATION
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
Upon completing the course, graduates will be able to: 1. Perform maintenance on different aircraft in accordance with the Approved Manufactures Maintenance Manuals and CAAB regulations	1.1 Carry out aircraft servicing and operational checks on components and instruments 1.2 Carry out servicing on aircraft and aircraft systems. 1.3 Carry out maintenance and Operate Ground support equipment such as aircraft jacks, ground power units and aircraft chocks. 1.4 Use the specific tool for the given task. 1.5 Follow the procedure for toolbox upkeep, control and maintenance in accordance with CAAB AMO regulation 18 (Equipment tools and materials). 1.6 Identify the approved maintenance materials and demonstrate proper application. 1.7 Store tools as per Manufacturer's specifications and Regulatory requirements. 1.8 Carry out removal and installation of components and structures as per approved maintenance procedures. 1.9 Disassemble and reassemble aircraft system components
2. Conduct visual and detailed Inspection of Aircraft's parts, systems and procedural functions in accordance with Approved Manufactures Maintenance Manuals and CAAB Regulations	2.1 Carry out daily, pre-flight and after flight Inspections, periodic, scheduled and unscheduled Inspections in accordance with organizational requirements and established codes of practice. 2.2 Demonstrates knowledge and understanding of the importance of inspection and associated procedures.

	2.3 Read and interpret technical drawings and specifications
3. Perform maintenance projections, planning and relevant research in mandatory manufactures requirements and other A/C specific requirements.	3.1 Identify the relevant maintenance schedule for the particular aircraft. 3.2 Compile mandatory maintenance scheduled components and paperwork like Inspection checklist, maintenance programs, Airworthiness Directives, Service Bulletins, Advisory Circulars and other aircraft specific documents. 3.3 Plan for maintenance works and procure the required parts and materials. 3.4 Ensure that the tools used are in proper condition and calibrated
4. Identify and solve complex and unpredictable problems in aircraft systems and components through methodical and thorough troubleshooting.	4.1 Identify the problem through visual, verbal, written report or functional test. 4.2 Carry out operational testing/functional check. 4.3 Apply knowledge of inter relations between aircraft components when running diagnostic tests and formulating solutions. 4.4 Diagnose malfunctions or other problems in the aircraft system. 4.5 Apply knowledge of the aircraft systems to solve the identified problems.
5. Carry out minor repairs, alterations and modifications on Aircrafts structures and components in accordance with the Approved Maintenance Manuals and CAAB regulations	5.1 Examine technical logbooks for any defects or issues arising. 5.2 Inspect the aircraft for issues stated in logbooks. 5.3 Generate solutions or decisions to rectify problems. 5.4 Remove and replace defective components as per the relevant

	procedures in the aircraft manuals. 5.5 Make proper entries in the relevant aircraft documents.
6. Interpret quality, safety, ethics, teamwork, preventive maintenance, workmanship and communication.	6.1 Communicate effectively in an occupational environment. 6.2 Work in teams, practicing tolerant behavior. 6.3 Demonstrate safe working practices and techniques. 6.4 Exercise professionalism in the delivery of aircraft maintenance and repair services. 6.5 Interact with and treat customers with respect and dignity
7. Complete all required maintenance and legal paperwork related to aircraft maintenance and parts in accordance with organizational requirements and established codes of practice.	7.1 Complete aircraft maintenance documentation. 7.2 Keep logbooks up to date. 7.3 Participate in internal audits associated with aircraft maintenance and repair documentation.
8. Demonstrate knowledge and understanding of regulatory information from regulatory authorities and technical instructions, procedures and information provided by aircraft manufactures.	8.1 Interpret aviation regulatory requirements, technical instructions, procedures and information from relevant entities. 8.2 Comply with rules and regulations

SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	TITLE	Credits Per Relevant NCQF Level			Total Credits
		Level [5]	Level [6]	Level [7]	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	1. Mathematics I	10			10
	2. Physics	8			8
	3. Aerodynamics	10			10
	4. Air Regulations	10			10
	5. Engineering Drawings	10			10
	6. Mathematics II	12			12
	7. Aircraft Materials & Processes	10			10
	8. Tools & Workshop Practices	12			12
	9. Electrical & Electronic Fundamentals	11			11
	10. Fire Protection Systems	4			4
	11. Aircraft Weight & Balance	6			6
	12. Piston Engines I	13			13
CORE COMPONENT *Subjects/Courses/ Modules/Units*	13. Digital Techniques		12		12
	14. Mathematics III		13		13
	15. Hydraulics, Pneumatics & Landing Gear		11		11

	16. Aircraft Structures		17		17
	17. Aircraft Electrical Systems		12		12
	18. Airframe Fuel System		6		6
	19. Gas Turbine Engines I		13		13
	20. Aircraft Rigging & Assembly		6		6
	21. Propellers		7		7
	22. Aircraft Instrument Systems		15		15
	23. Cabin Atmosphere Control		6		6
	24. Ice & Rain Protection System		6		6
	25. Helicopters		19		19
	26. Automatic Flight Control Systems		8		8
	27. Radio Navigation Systems		12		12
	28. Human Factors		3		3
	29. Aircraft Documentation & Inspections		11		11
	30. Gas Turbine Engines II		10		10
	31. Piston Engines II		10		10
	32. Project		15		15
	33. Industrial Attachment		40		40

Electives Choose any one (1)	34. Safety Management Systems	3			3
	35. Aviation History	3			3

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	*Credit Value*
5	*119*
6	*252*
TOTAL CREDITS	*371*

Rules of Combination:

(Please Indicate combinations for the different constituent components of the qualification)

The overall total credits for this qualification are made up of all Fundamental modules, all Core modules and two (2) Electives module.

ASSESSMENT ARRANGEMENTS
All assessments, formative and summative, leading/contributing to the award of credits or qualifications should be based on learning outcomes and/or sub-outcomes. Formative assessments contribute 40% of the final grade, and Summative assessments contribute 60% The practical component of modules will be assessed on the basis of OBET.
MODERATION ARRANGEMENTS
Internal and external moderation of examinations shall be carried out according to ETP policies and regulations.
RECOGNITION OF PRIOR LEARNING
Candidates may submit evidence of prior learning and current competence and/or undergo appropriate forms of RPL assessment for the award of credits towards the qualification in accordance with applicable institutional RPL policies and relevant national-level policy and legislative framework. Implementation of RPL shall also be consistent with requirements, if any, prescribed for the field or sub-field of study by relevant national, regional or international professional bodies.
CREDIT ACCUMULATION AND TRANSFER
The subjects completed and credits accrued will be matched to the relevant standard(s) and credited accordingly for the award of this qualification. Any competencies gained through Civil Aviation Authority or any awarding body will be matched to the relevant assessment standard(s) and credited accordingly**.**
PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)
This qualification builds on the knowledge and skills acquired through the Diploma in Aircraft Maintenance Engineering qualification. o Horizontal Articulation • Diploma in Aeronautical Engineering • Commercial Pilot License Programme o Vertical Articulation • Bachelor's Degree in Aircraft Manufacturing • Bachelor's Degree in Aircraft Maintenance Engineering • Bachelor's Degree in Aviation Management • Bachelor's Degree in Aeronautical Engineering • Bachelor's Degree in Air Transportation Management • Bachelor's Degree in Aircraft Systems Engineering

The holders of this qualification are able to work in the Aviation Industry as:

- Aircraft Mechanic
- Aircraft Maintenance Technician
- Quality Assurance Manager
- Safety Management Manager
- Aircraft Maintenance Planner
- Aircraft Maintenance Engineering Officer
- Safety, Health and Environmental Officer
- Aircraft Documentation and Records Management Officer
- Maintenance Control Officer

QUALIFICATION AWARD AND CERTIFICATION

Minimum standards of achievement for the award of the qualification

A candidate is required to achieve the stipulated (371) total credits to be awarded a Diploma in Aircraft Maintenance Engineering qualification.

Certification

Candidates meeting prescribed requirements will be issued with certificates in accordance with the standards prescribed for the award of the qualification and applicable policies. Candidates who do not meet the prescribed minimum standards will be issued a record of learning achievement, indicating the modules achieved and those not yet achieved.

License Without Type Rating

On completion of the entire programme, the graduates are eligible to sit for the License Without Type Rating examination, which is conducted by the Civil Aviation Authority of Botswana after completing two years of practical work in the aviation industry.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The benchmarking for this curriculum was done with a number of renowned universities/colleges, both regionally and internationally. The comparison revealed that a Diploma in Aircraft Maintenance Engineering for FM-AMETS (Pty) Ltd T/A Aviation Academy Flying Mission was found to compete favourably.

The colleges/universities which where benchmarked with include though not limited to: Algonquin College from Canada, Nilai University from Malaysia and Kenya Aeronautical College from Kenya to mention but few

It was observed that the purpose all of the qualifications was to have access to employment, professional registration and further study.
The requirements for the award for all colleges/universities include course work, examination,

project and industry based learning.

The minimum duration for the programme is three years for FM-AMETS (Pty) Ltd T/A Aviation Academy Flying Mission, two years, six months for Algonquin College, three years for Kenya Aeronautical College and two and half years for Nilai University. The level for the three colleges/universities in each country is higher education.
The minimum entry requirements are similar, which is a school certificate or NCQF level IV. This is adequately comparable.

It was observed that different universities/colleges for Diploma in Aircraft Maintenance Engineering qualification don't use the notional 10-hour learning for one credit.
In this vein, the total credits awarded at the completion of the qualification are different for each college/university.

The number of modules in the FM-AMETS (Pty) Ltd T/A Aviation Academy Flying Mission diploma is 35, while for Algonquin College, it is 31, and Nilai University has 33 modules.
This is adequately comparable. The difference is negligible, and this can be attributed to the fact that some colleges compress two also modules into one module.

Generally, the three qualifications studied cover similar content scope and emphasize the development of the same competencies. All Institutions offer a diploma award.
The proposed qualification generally compares well with the two qualifications studied in terms of content scope, exit outcomes as well as mode of assessment. The duration of the program ranges from two and a half years to three years. This is adequately comparable.

The proposed qualification competes favourably with regionally and internationally renowned colleges/universities.

It was concluded that the qualification based on the similarities and minor differences determined is portable and generalizable within the regional and international colleges/universities.
This is consistent with the highly regulated nature of the industry and its international character.

What sets FM-AMETS qualification apart from some of the other colleges/universities is that the proposed qualification provides more learning hours, hands-on training and attachment to Approved Maintenance Organizations for on-the-job skills training. Furthermore, the FM-AMETS qualification is more comprehensive in terms of the number of modules offered. There is also a research project which some of the colleges studied above do not provide. Moreover, some colleges/university have specialisation of avionics and Airframes and power plant. However, FM-AMETS have combined both of them. This adds more value to the FM-AMETS qualification in that holders have an additional employment pathway.

REVIEW PERIOD

This qualification will be reviewed every after five (5) years.

For Official Use Only:

CODE (ID)			
REGISTRATION STATUS	**BQA DECISION NO.**	**REGISTRATION START DATE**	**REGISTRATION END DATE**
LAST DATE FOR ENROLMENT		**LAST DATE FOR ACHIEVEMENT**	