BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS																	
QUALIFICATION DEVELOPER (S)	Joint Technical Training School, Botswana Defence Force																	
TITLE	Diploma in Automotive Electrical Engineering												**NCQF LEVEL**		6			
STRANDS (where applicable)	N/A																	
FIELD	Manufacturing, Engineering and Technology												**CREDIT VALUE**		360			
SUB FIELD	Engineering and Engineering Trades																	
New Qualification	√	Legacy Qualification											Renewal Qualification					
													Registration Code					
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

This qualification is designed to address the emergent need of technicians in Botswana due to the exponential growth of the Automobile Industry in the recent past years. This growth is both in quantity and quality. The industry is advancing owing to incorporation of technology which leads to more complex and robust vehicle systems being introduced. Quantitatively, the influx of imported second hand vehicles from Asian countries and franchised Motor dealers of Botswana has also necessitated skills development in the industry. The need for this qualification was specifically provoked by the same need in the Botswana Defence Force

According to the Education and Training Sector Strategic Plan, 'while training programmes are designed to address many of the areas that are important for employers, graduates do not exhibit the characteristics of people who have internalized learning in these areas. This suggests that there are weaknesses in quality and relevance in TVET pedagogy and practice.' ETSSP, (2015 – 2020, Page 30). This important research greatly influenced the development of this qualification to be more occupation focused and provide a better targeted route for graduates, and benefit employers and the economy. According to the Priority Skills Report, March 2025 by the Human Resource Development Council (HRDC), Botswana faces a significant mismatch between graduate skills and the demand in industry, especially in sectors like automobile Engineering, highlighting the need for qualifications and training programmes that directly address these gaps. This qualification is meant to address the skills mismatch in this regard. Vision 2036 targets transport and logistics services as essential for economic growth for the country, the automotive industry strategically forms part of the service industry and this qualification will contribute positively to the growth of the industry.

A survey was conducted by the qualification developer prior to designing this qualification, this was done to identify limitations in the Automotive Engineering sector. It was found out that most auto mechanics and technicians lacked key skills critical to the industry, this included Computer Aided Design and Manufacturing, Communication Skills, Information Technology Skills as well as basic Management Skills. These skills will make the graduate to be proficient with modern engineering methods to meet the market expectations.

PURPOSE: (itemise exit level outcomes)

The purpose of this qualification is to produce graduates with advanced knowledge, skills and competence to:

1. Diagnose and troubleshoot motor vehicle electrical and electronic system faults using modern methods and technology.
2. Service, repair and maintain automotive electrical and auxiliary systems.
3. Apply advanced problem-solving techniques in automotive electrical engineering context.
4. Supervise and coordinate small teams of technical staff in workshop environments.
5. Apply principles of modern and emerging automotive electrical and electronic systems and technologies in practice.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)
1. Certificate IV at NCQF level 4 (BGCSE) or equivalent. 2. Access through RPL and CAT will be provided through ETP policies in line with national RPL and CAT Policies.

SECTION B QUALIFICATION SPECIFICATION	
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
1. Apply engineering principles to systematically diagnose and solve problems related to automotive electrical systems.	1.1 Inspect, test the vehicle and apply proper fault-finding techniques. 1.2 Analyze electrical faults using the latest vehicle diagnostic machines and devices. 1.3 Interpret information received through diagnosing devices from different computerized systems in the vehicle.
2. Apply knowledge of mathematics, natural sciences and engineering sciences to applied engineering procedures, processes, systems and methodologies to solve well-defined automotive electrical engineering problems.	2.1 Carry out necessary calculations to determine efficiency of electrical components and systems in order to remedy any eminent problems. 2.2 Use known theories to deduct possible conditions leading to experienced automotive electrical faults in order to arrive at appropriate solutions to the same. 2.3 Assess vehicle components performance against recommended conditions and devise remedies for short falls.
3. Perform procedural design of automotive electrical components and systems to meet requirements within applicable standards, codes of practice and legislation.	3.1 Use established design processes and methodologies to arrive at appropriate solutions in the form of components or systems as may be determined by the requirements arising from the problem.

	3.2 Use relevant design languages such as engineering drawing to communicate ideas according to established standards. 3.3 Employ the use of simulating software to determine the efficiency of an automotive electrical component or system.
4. Conduct investigations of automotive electrical systems problems through locating and searching relevant codes and catalogues, conducting standard tests, experiments and measurements.	4.1 Select available automotive electrical literature to correct possible errors in vehicle components and systems. 4.2 Carry out standard tests, experiments and measurements to determine causes of automotive electrical problems and solutions thereto. 4.3 Interpret findings and formulate solutions in accordance with required standards.
5. Use appropriate techniques, resources and modern engineering tools including information technology for the solution of automotive electrical problems with an awareness of the limitations, restrictions, premises, assumptions and standards.	5.1 Conduct automotive electrical diagnostics according to industry best practices. 5.2 Use the correct automotive electrical engineering tools for the task at hand. 5.3 Employ the use of vehicle related software to establish automotive electrical problems.
6. Communicate effectively, both orally and in writing within an automotive electrical engineering environment.	6.1 Compile reports in established automotive electrical engineering format. 6.2 Apply automotive electrical engineering communication standards in the design and presentation of ideas in engineering drawing format. 6.3 Use the correct automotive electrical engineering jargon to refer to components and systems.

7. Demonstrate knowledge and understanding of the impact of automotive electrical engineering activity on the society, economy, industrial and physical environment, and address issues by defined procedures.	7.1 Identify benefits and negative impacts of automotive engineering activities. 7.2 Implement strategies to minimise negative impacts through adoption of green technologies. 7.3 Manage the control of automotive electrical engineering waste and categorise it according to its segregation.
8. Demonstrate knowledge and understanding of engineering management principles and apply these to an automotive electrical engineering environment as a member and leader in a technical team and to manage projects.	8.1 Apply basic problem solving techniques and basic research methods. 8.2 Analyse daily reports from subordinate technicians and prepare weekly reports to senior engineers. 8.3 Provide technical assistance and motivate subordinate technicians and artisans. 8.4 Demonstrate leadership and basic production management skills. 8.5 Apply basic project management skills such as job scheduling, budget estimates and costing and time management. 8.6 Maintain safe and conducive working conditions in the workplace. 8.7 Formulation of training plans for subordinates. 8.8 Comply with ethical standards of the organization and legislation.
9. Conduct an independent and life-long learning through well-developed learning skills	9.1 Employ advanced knowledge and skills that conform to automotive electrical engineering standards gathered outside the academic learning achieved. 9.2 Demonstrate continued competence through keeping abreast of up-to-date tools and techniques available in the workplace.

	9.3 Review existing knowledge to identify gaps and propose remedies for adopting to evolving technological and intelligent machine environments.
10. Demonstrate understanding and commitment to professional ethics, responsibilities and norms of engineering technical practice in automotive electrical environment.	10.1 Apply required practices, legislation and limitations of authority to solve ethical dilemmas. 10.2 Describe the ethical implications of engineering decisions in terms of the impact on environment, the business, costs and trustworthiness. 10.3 Make decisions that are ethical and within boundaries of current competence during problem solving. 10.4 Show an understanding of the responsibility for consequences arising from own actions or inaction.
11. Demonstrate an understanding of workplace practices to solve automotive electrical engineering problems consistent with academic learning achieved.	11.1 Adhere to the working environment in terms of company structure and conventions, rules, policies, working hours, dress codes and reporting lines. 11.2 Follow labour practices used in the workplace in accordance with relevant legislation. 11.3 Recognise workplace safety in accordance with relevant safety, health and environment legislation.

SECTION C	**QUALIFICATION STRUCTURE**				
COMPONENT	**TITLE**	**Credits Per Relevant NCQF Level**			**Total Credits**
		Level [4]	**Level [5]**	**Level [6]**	
	Mathematics I		8		8

FUNDAMENTAL COMPONENT	Physics		10		10
	Technical Drawing		8		8
	Computer Technology		6		6
	Workshop Technology		10		10
	Technical Communication		6		6
	Mathematics II		8		8
	Mathematics III			10	10
	Mathematics IV			10	10
	Computer Aided Design			8	8
CORE COMPONENT Subjects/Courses/ Modules/Units		**Credits Per Relevant NCQF Level**			**Total Credits**
		Level (4)	**Level (5)**	**Level (6)**	
	Troubleshooting and Maintenance Procedures			10	10
	Fluid Power Systems I		8		8
	Basic Control Engineering		8		8
	Motor Vehicle Science		10		10
	Motor Vehicle Technology		10		10
	Electrical & Electronic Engineering Principles		10		10
	Entrepreneurial Skills		6		6
	Petrol Engines		8		8

	Diesel Engines		8		8
	Measurements and Instrumentation		10		10
	Vehicle Electrics		10		10
	Introduction to Software Engineering			8	8
	Electrical Systems		9		9
	Ancillary Equipment		10		10
	Electronic Injection and Ignition		7		7
	Motor Vehicle Practice		10		10
	Sensors and Data Transfer		10		10
	Work Placement I		20		20
	Work Placement II		20		20
	Automotive Systems Programming			7	7
	Modern Fuel Injection Systems			7	7
	Green Car Technology			7	7
	Operations Management			7	7
	Advanced Vehicle Electronics			8	8
	Project			8	8
	Work Placement III			20	20
STRANDS/ SPECIALIZATION	Subjects/ Courses/ Modules/Units	**Credits Per Relevant NCQF Level**			**Total Credits**
		Level [4]	**Level [5]**	**Level [6]**	

1.					
2.					
Electives	Transmission		10		10
	Steering and Suspension		10		10
	Cooling and Lubrication		10		10
	Braking System		10		10

BOTSWANA Qualifications Authority

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	**Credit Value**
5	190
6	170
TOTAL CREDITS	**360**
Rules of Combination: **(Please Indicate combinations for the different constituent components of the qualification)**	
To achieve the qualification, a learner must complete a minimum of 360 credits comprising 70 credits from Fundamental modules, 270 credits from Core modules, and at least 20 credits from Elective modules.	

BOTSWANA Qualifications Authority

ASSESSMENT ARRANGEMENTS

ASSESSMENT
Assessment will be integrated, made up of Formative and Summative Assessment.

Formative Assessment
Formative assessment will be administered throughout the learning period in the form of written tests and practical and formative assessment shall contribute 50% of the final grade of the course.

Summative Assessment
A summative assessment will be administered at the end of each module. Summative assessment shall contribute 50% to the course final grade.

Assessment will be conducted by BQA registered and accredited assessors. Assessors must possess a minimum qualification of Bachelor of Engineering in Automotive Electrical Engineering or related field with a teaching and assessment qualification (e.g. PGDE, CVET, DVET, PGDHE).

MODERATION ARRANGEMENTS

Both internal and external moderation processes will be carried out by BQA registered and accredited moderators in line with institutional policies.
Moderators must possess a minimum qualification of Bachelor of Engineering in Automotive Engineering or related field. The moderator should be a highly experienced assessor with a teaching, assessment and moderation qualification.

RECOGNITION OF PRIOR LEARNING

RPL will be applicable for gaining credits towards the qualification in accordance to ETP policies that align with national RPL policies.

CREDIT ACCUMULATION AND TRANSFER

CAT will be applicable for gaining credits towards the qualification in accordance to ETP policies that align with national CAT policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation

1. Diploma in Heavy Plant Engineering
2. Diploma in Mechanical Engineering
3. Diploma in Mechatronics Engineering

Vertical Articulation

1. Bachelor of Engineering in Automobile Engineering

2. Bachelor of Engineering in Mechanical Engineering
3. Bachelor of Engineering in Industrial Engineering
4. Bachelor of Engineering in Mechatronics Engineering

QUALIFICATION AWARD AND CERTIFICATION

QUALIFICATION AWARD*:* To be awarded the qualification of Diploma in Automotive Electrical Engineering, a candidate should satisfy the requirements of the qualification, which is 360 Credits; 70 Credits of Fundamental modules, 270 Credits of Core modules and 20 Credits Elective modules.

CERTIFICATION: Upon successful completion of all requirements of the qualification, the ETP shall issue transcripts and certificates to the graduates

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

This comparability matrix presents a structured analysis of the proposed Diploma in Automotive Electrical Engineering against similar qualifications from selected international and regional institutions: Anoka Technical College (USA), GIPS (Botswana), and Tshwane South TVET College (South Africa). The objective is to demonstrate alignment in terms of qualification level, learning outcomes, curriculum content, assessment strategies, and articulation pathways. This analysis supports the accreditation process by highlighting the relevance and competitiveness of the proposed qualification within the global automotive education landscape.

1. SIMILARITIES

a. Title of Qualification, NQF Level & Credit Value or Duration

All qualifications are positioned at post-secondary level and are designed to prepare learners for skilled technical occupations in the automotive field. They typically combine theoretical instruction with practical training components delivered over a period ranging between approximately 2 to 3 years, depending on institutional structure.

b. Main Exit Outcome(s)

Across all institutions, the primary exit outcomes are closely aligned. Each qualification equips learners with competencies to diagnose, service and repair automotive electrical and electronic systems. The emphasis is consistently placed on workplace readiness, particularly for roles in workshops, garages and fleet maintenance environments.

c. Domains/Modules/Courses/Subjects Covered (Fundamental, Core & Electives)

There is strong alignment in core technical content across institutions. Common subject areas include vehicle electrical systems, diagnostics, engine performance, safety procedures, and workshop practice. All qualifications incorporate laboratory or workshop-based experiential learning as a key delivery method.

d. Assessment Strategies and Weightings

All qualifications use a blended assessment approach combining theoretical examinations and practical or performance based assessments. Work integrated learning or structured practical training forms an essential component across all institutions.

e. Qualification Rules and Minimum Standards for Award

Each qualification requires successful completion of prescribed modules and the achievement of minimum practical training requirements. Progression and award of qualification are dependent on meeting both theoretical and practical competence standards.

f. Education and Employment Pathways

All qualifications provide pathways into employment as automotive technicians, diagnostic specialists, or workshop supervisors. In addition, each qualification offers articulation opportunities into higher-level qualifications, including advanced diplomas, degrees, or industry-recognised certifications.

2. DIFFERENCES

a. Title of Qualification, NQF Level & Credit Value or Duration

JTTS and GIPS offer longer qualifications (3 years) with broader curriculum coverage, whereas Anoka Technical College and Tshwane South TVET College offer shorter or modular qualifications ranging from 1 to 2 years. Additionally, JTTS uses an NCQF Level 5 credit based system (260+ credits), while other institutions use credit hours (USA) or modular N-level systems (South Africa), indicating differences in academic structuring.

b. Main Exit Outcome(s)

The JTTS qualification extends beyond conventional automotive electrical competencies to include advanced diagnostics, microcontroller systems, leadership development, and military vehicle applications. In contrast, Anoka focuses primarily on automotive electrical systems, while GIPS incorporates broader industrial and power systems content.

c. Domains/Modules/Courses/Subjects Covered (Fundamental, Core & Electives)

While all qualifications share foundational automotive electrical content, JTTS places greater emphasis on modern electronic systems, programming, sensors, and military-grade applications. GIPS integrates industrial electronics and power systems, whereas Anoka maintains a narrower focus on core automotive electrical technology

d. Assessment Strategies and Weightings

JTTS applies a balanced 50/50 formative and summative assessment model. In contrast, South African TVET institutions place stronger emphasis on national summative examinations, while U.S. institutions such as Anoka utilise performance based assessment models aligned with credit hour systems rather than national qualifications frameworks

e. Qualification Rules and Minimum Standards for Award

JTTS requires completion of all 260 credits, including a structured trimester long apprenticeship. Tshwane South TVET requires N4 to N6 subject completion plus 18 months of workplace experience, GIPS follows a 360 credit structure and Anoka requires approximately 45 to 60 credit hours with passing grades in assessed modules

f. Education and Employment Pathways

While all qualifications support progression to higher education, JTTS provides additional articulation into engineering and business degree pathways with a specialised military technical track. Anoka graduates typically progress toward ASE certification, while Tshwane South follows a structured progression from N-levels to BTech qualifications.

3. CONCLUSION

The comparative analysis demonstrates that the proposed Diploma in Automotive Electrical Engineering is broadly aligned with regional and international standards in terms of qualification level, core competencies, curriculum content, assessment methods and career pathways. While variations exist in duration, credit systems and depth of specialisation, these differences reflect contextual and institutional design rather than conceptual misalignment. Importantly, the JTTS qualification demonstrates enhanced technical depth through its integration of advanced diagnostics, digital systems and military applications, positioning it as a more specialised and industry relevant qualification within the automotive engineering education landscape

REVIEW PERIOD
The qualification will be reviewed every five 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**	