REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS FOR AUTOMOTIVE TECHNICIAN

LEVEL 6

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 (Sessional Paper No. 4 of 2016). 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 these Occupational Standards were developed for the purpose of developing a competency based curriculum for Electrical Technician Level 6. These Occupational Standards will also be the bases for assessment of an individual for competence certification.

It is my conviction that these Occupational Standards will play a great role towards development of competent human resource for the Electrical 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 and Sessional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification in TVET. This called for shift to CBET in order 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.

The TVET Curriculum Development, Assessment and Certification Council (TVET CDACC), in conjunction with Building Sector Skills Advisory Committee (SSAC), have developed these Occupational Standards for a Building Technician. These standards will be the bases for development of competency-based curriculum for Building Technician level 6.

The occupational standards are designed and organized with clear performance criteria for each element of a unit of competency. These standards also outline the required knowledge and skills as well as evidence guide. I am grateful to the Council members, Council Secretariat, Building SSAC, expert workers and all those who participated in the development of these occupational standards.

Prof. CHARLES M. M. ONDIEKI, PhD, FIET (K), Con. EngTech.
CHAIRMAN, TVET CDACC

ACKNOWLEDGMENT

These Occupational Standards were developed through combined effort of various stakeholders from private and public organizations. I am sincerely thankful to the management of these organizations for allowing their staff to participate in this course. I wish to acknowledge the invaluable contribution of industry players who provided inputs towards the development of these Standards.

I thank TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) for providing guidance on the development of these Standards. My gratitude goes to the Electrical Engineering Sector Skills Advisory Committee (SSAC) members for their contribution to the development of these Standards. I thank all the individuals and organizations who participated in the validation of these Standards.

I acknowledge all other institutions which in one way or another contributed to the development of these Standards.

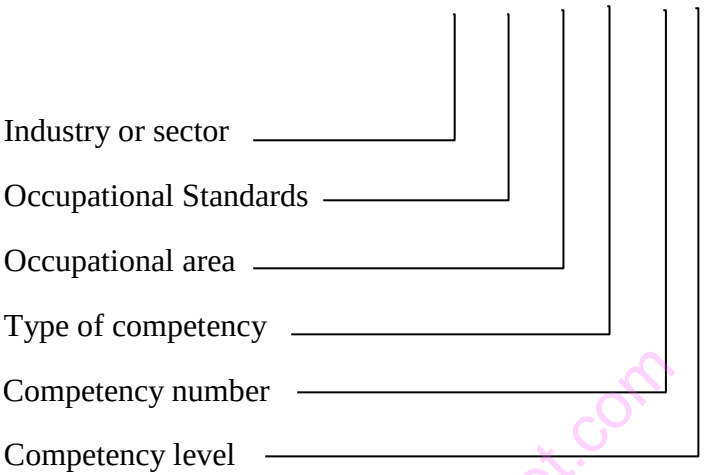
CHAIRMAN ELECTRICAL ENGINEERING SECTOR SKILLS ADVISORY COMMITTEE

ACRONYMS

AC	Air conditioning
CDACC	Curriculum Development, Assessment and Certification Council
CI	Compression ignition
CV	Constant velocity joint
DTI	Dial test indicator
FOT	Fixed orifice tube
GPS	Global positioning system
ICT	Information and Communication Technology
KCSE	Kenya Certificate of Secondary Education
KNQA	Kenya National Qualification Authority
KNQF	Kenya National Qualification Framework
KPI	King Pin inclination
OBD	On-board diagnostics
PPE	Personal protective equipment
SI	Spark ignition
TVET	Technical and Vocational Education and Training
TXV	Thermal expansion valve
UJ	Universal joint

KEY TO UNIT CODE

ENG/OS/ET/BC/01/6



OVERVIEW

The Automotive Technician Level 6 qualification consists of competencies that a person must achieve to enable him/her to service and maintain motor vehicles in the motorvehicle service and repair industry.

The units of competency comprising Automotive Technician certificate level 6 qualifications include the following basic and core competencies:

BASIC COMPETENCIES

1. Demonstrate communication skills.
2. Demonstrate digital literacy.
3. Demonstrate entrepreneurial skills.
4. Demonstrate employability skills.
5. Demonstrate environmental literacy.
6. Demonstrate occupational safety and health practices.

COMMON UNITS OF COMPETENCY

1. Technical Drawing
2. Apply engineering Mathematics
3. Applying automotive engineering science principles
4. Applying workkshop technology principles

CORE COMPETENCIES

1. Service and repair motor vehicle
2. Service and repair vehicle engines components
3. Service vehicle fuel systems
4. Service vehicle transmission system
5. Service vehicle steering systems
6. Service vehicle suspension systems
7. Service vehicle braking systems
8. Service vehicle electrical systems

BASIC UNITS OF COMPETENCY

DEMONSTRATE COMMUNICATION SKILLS

UNIT CODE: ENG/OS/AUT/BC/1/6

UNIT DESCRIPTION

This unit covers the competencies required in meeting communication needs of clients and colleagues; developing, establishing, maintaining communication pathways and strategies. It also covers competencies for conducting interviews, facilitating group discussion and representing the organization in various forums.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Meet communication needs of clients and colleagues.	1.1 Specific communication needs of clients and colleagues are identified and met. 1.2 Different approaches are used to meet communication needs of clients and colleagues. 1.3 Conflict is addressed promptly and in a timely way and in a manner which does not compromise the standing of the organization.
2. Develop	2.1 Strategies for effective internal and external

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
communication strategies.	dissemination of information are developed to meet the organization's requirements. 2.2 Special communication needs are considered in developing strategies to avoid discrimination in the workplace. 2.3 Communication ***strategies*** are analyzed, evaluated and revised where necessary to make sure they are effective.
3. Establish and maintain communication pathways.	3.1 Pathways of communication are established to meet requirements of organization and workforce. 3.2 Pathways are maintained and reviewed to ensure personnel are informed of relevant information.
4. Promote use of communication strategies.	4.1 Information is provided to all areas of the organization to facilitate implementation of the strategy. 4.2 Effective communication techniques are articulated and modelled to the workforce. 4.3 Personnel are given guidance about adapting communication strategies to suit a range of contexts.
5. Conduct interview.	5.1 A range of appropriate communication strategies are employed in ***interview situations.*** 5.2 Records of interviews are made and

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	maintained in accordance with organizational procedures. 5.3 Effective questioning, listening and nonverbal communication techniques are used to ensure that the required message is communicated.
6. Facilitate group discussion.	6.1 Mechanisms which enhance ***effective group interaction*** is defined and implemented. 6.2 Strategies which encourage all group members to participate are used routinely. 6.3 Objectives and agenda for meetings and discussions are routinely set and followed. 6.4 Relevant information is provided to the group to facilitate outcomes. 6.5 Evaluation of group communication strategies is undertaken to promote participation of all parties. 6.6 Specific communication needs of individuals are identified and addressed.
7. Represent the organization.	7.1 When participating in internal or external forums, presentation is relevant, appropriately researched and presented in a manner to promote the organization. 7.2 Presentation is clear and sequential and delivered within a predetermined time.

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	7.3 Appropriate media is utilized to enhance presentation. 7.4 Differences in views are respected. 7.5 Written communication is consistent with organizational standards. 7.6 Inquiries are responded to in a manner consistent with organizational standards.

RANGE

This section provides work environment and conditions to which the performance criteria

apply. It allows for different work environment and situations that will affect performance.

Variable	Range
1. Communication strategies may include but not limited to:	1.1 Language switch. 1.2 Comprehension check. 1.3 Repetition. 1.4 Asking for confirmation. 1.5 Paraphrase. 1.6 Clarification request. 1.7 Translation. 1.8 Restructuring. 1.9 Approximation. 2.0 Generalization.

1. Effective group interaction may include but not limited to:	2.1 Identifying and evaluating what is occurring within an interaction in a non judgmental way. 2.2 Using active listening. 2.3 Making a decision about appropriate words, behavior. 2.4 Putting together a response which is culturally appropriate. 2.5 Expressing an Individual perspective. 2.6 Expressing own philosophy, ideology and background and exploring its impact with relevance to communication.
2. Situations may include but not limited to:	3.1 Establishing rapport. 3.2 Eliciting facts and information. 3.3 Facilitating resolution of issues. 3.4 Developing action plans. 3.5 Diffusing potentially difficult situations.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Effective communication.
- Active listening.
- Giving/receiving feedback.
- Interpretation of information.
- Role boundaries setting.
- Negotiation.
- Establishing empathy.
- Openness and flexibility in communication.
- Communication skills required to fulfil job roles as specified by the organization.
- Writing communications strategy.
- Applying key elements of communications strategy.

Required Knowledge

The individual needs to demonstrate knowledge of:

- Communication process.
- Dynamics of groups and different styles of group leadership.
- Communication skills relevant to client groups.
- Flexibility in communication.
- Communication skills relevant to client groups.
- Key elements of communications strategy.

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Developed communication strategies to meet the organization requirements and applied in the workplace 1.2 Established and maintained communication pathways for effective communication in the workplace 1.3 Used communication strategies involving exchanges of complex oral information
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Materials relevant to the proposed Activity or tasks
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Direct Observation/Demonstration with Oral Questioning 3.2 Written Examination
4. Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE DIGITAL LITERACY

UNIT CODE: ENG/OS/AUT/BC/2/6

UNIT DESCRIPTION

This unit covers the competencies required to effectively using digital devices such as

Smartphones, tablets, laptops and desktop PCs. It entails identifying and using digital devices such as smartphones, tablets, laptops and desktop PCs for purposes of communication, work performance and management at the work place.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace functions.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Identify appropriate computer software and hardware.	1.1 Concepts of ICT are determined in accordance with computer equipment. 1.2 Classifications of computers are determined in accordance with manufacturer's specification. 1.3 ***Appropriate computer software*** are identified according to manufacturer's specification. 1.4 ***Appropriate computer hardware*** are identified according to manufacturer's specification. 1.5 Functions and commands of

ELEMENT These describe the key outcomes which make up workplace functions.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	operating system are determined in accordance with manufacturer's specification.
2. Apply security measures to data, hardware, and software in automated environment.	2.1 ***Data security and privacy are classified*** in accordance with the prevailing technology. 2.2 ***Security threats*** are identified ***and control measures*** are applied in accordance with laws governing protection of ICT. 2.3 Computer threats and crimes are detected. 2.4 Protection against computer crimes is undertaken in accordance with laws governing protection of ICT.
3. Apply computer software in solving tasks	3.1 ***Word processing concepts*** are applied in resolving workplace tasks, report writing and documentation. 3.2 ***Word processing utilities*** are applied in accordance with workplace procedures. 3.3 Worksheet layout is prepared in accordance with work procedures. 3.4 Worksheets are built and data manipulated in the worksheets in accordance with workplace

ELEMENT These describe the key outcomes which make up workplace functions.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	procedures. 3.5 Continuous data manipulated on worksheet is undertaken in accordance with work requirements 3.6 Database design and manipulation is undertaken in accordance with office procedures. 3.7 Data sorting, indexing, storage, retrieval and security is provided in accordance with workplace procedures.
4. Apply internet and email in communication at workplace.	4.1 Electronic mail addresses are opened and applied in workplace communication in accordance with office policy. 4.2 Office internet functions are defined and executed in accordance with office procedures. 4.3 ***Network configuration*** is determined in accordance with office operations procedures. 4.4 Official World Wide Web is installed and managed according to workplace procedures.
5. Apply Desktop publishing in official assignments.	5.1 Desktop publishing functions and tools are identified in accordance

ELEMENT These describe the key outcomes which make up workplace functions.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	with manufactures specifications. 5.2 Desktop publishing tools are developed in accordance with work requirements. 5.3 Desktop publishing tools are applied in accordance with workplace requirements. 5.4 Typeset work is enhanced in accordance with workplace standards.
6. Prepare presentation packages.	6.1 Types of presentation packages are identified in accordance with office requirements. 6.2 Slides are created and formulated in accordance with workplace procedures. 6.3 Slides are edited and run in accordance with work procedures. 6.4 Slides and handouts are printed according to work requirements.

RANGE

This section provides work environments and conditions to which the performance criteria
apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Appropriate computer software may include but not limited to:	A collection of instructions or computer tools that enable the user to interact with a *computer*, its hardware, or perform tasks.
2. Appropriate computer hardware may include but not limited to:	A collection of physical parts of a computer system such as; 2.1 Computer case, monitor, keyboard, and mouse 2.2 All the parts inside the computer case, such as the hard disk drive, motherboard and video card.
3. Data security and privacy may include but not limited to:	3.1 Confidentiality of data. 3.2 Cloud computing. 3.3 Integrity-but-curious data surfing.
4. Security and control measures may include but not limited to:	4.1 Counter measures against cyber terrorism. 4.2 Risk reduction. 4.3 Cyber threat issues. 4.4 Risk management. 4.5 Pass-wording.
5. Security threats may include but not limited to:	5.1 Cyber terrorism. 5.2 Hacking.
6. Word processing concepts may include	Using a special program to create, edit and print documents.

Variable	Range
but not limited to:	
7. Network configuration may include but not limited to:	Organizing and maintaining information on the components of a computer network.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Analytical skills.
- Interpretation.
- Typing.
- Communication.
- Computing (applying fundamental operations such as addition, subtraction, division and multiplication).
- Using a calculator.
- Basic ICT skills.

Required Knowledge

The individual needs to demonstrate knowledge of:

- Software concept.
- Functions of computer software and hardware.
- Data security and privacy.
- Computer security threats and control measures.
- Technology underlying cyber-attacks and networks.
- Cyber terrorism.
- Computer crimes.
- Detection and protection of computer crimes.
- Laws governing protection of ICT.
- Word processing;
    - Functions and concepts of word processing.
    - Documents and tables creation and manipulations.
    - Mail merging.
    - Word processing utilities.
- Spread sheets;
    - Meaning, formulae, function and charts, uses and layout.
    - Data formulation, manipulation and application to cells.
- Database;
    - Database design, data manipulation, sorting, indexing, storage retrieval and security
- Desktop publishing;
    - Designing and developing desktop publishing tools.
    - Manipulation of desktop publishing tools.
    - Enhancement of typeset work and printing documents.
- Presentation Packages;
    - Types of presentation packages.
    - Creating, formulating, running, editing, printing and presenting slides and handouts.
- Networking and Internet;
    - Computer networking and internet.

- Electronic mail and World Wide Web.
- Emerging trends and issues in ICT;
  - Identify and integrate emerging trends and issues in ICT.
  - Challenges posed by emerging trends and issues.

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance
criteria, required skills and knowledge and range.

1. Critical Aspects of Competency.	Assessment requires evidence that the candidate: 1.1 Identified and controlled security threats. 1.2 Detected and protected computer crimes. 1.3 Applied word processing in office tasks. 1.4 Designed, prepared work sheet and applied data to the cells in accordance to workplace procedures. 1.5 Opened electronic mail for office communication as per workplace procedure. 1.6 Installed internet and World Wide Web for office tasks in accordance with office procedures. 1.7 Integrated emerging issues in computer ICT applications. 1.8 Applied laws governing protection of ICT.
2. Resource	2.1 Tablets.

Implications.	2.2 Laptops. 2.3 Desktop PCs. 2.4 Desktop computer. 2.5 Calculator. 2.6 Internet. 2.7 Smart phone. 2.8 Operations Manuals.
3. Methods of Assessment.	C Competency may be assessed through: 3.1 Written Test. 3.2 Demonstration. 3.3 Practical assignment. 3.4 Interview/Oral Questioning. 3.5 Demonstration.
4. Context of Assessment.	Competency may be assessed in an off and on the job setting.
5. Guidance information for assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE ENTREPRENEURIAL SKILLS
UNIT CODE: ENG/OS/AUT/BC/3/6

UNIT DESCRPTION

This unit covers the outcomes required to build and develop the enterprise to be more competitive within a changing business environment, specifically responding to consumer demands while maintaining product quality and accessibility, building a customer base and employee motivation.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Develop business Innovative strategies.	1.1 Business innovation strategies are determined in accordance with the organization strategies. 1.2 Business innovation strategies are implemented for the purpose of business growth. 1.3 Track record and normative capability profile of enterprise and similar businesses are reviewed and considered in setting ***strategic directions***. 1.4 Strengths, weaknesses, opportunities and threats are considered when developing new ideas, approaches, goals and directions. 1.5 Decisions about enterprise strategies/directions are made after careful consideration of all relevant information. 1.6 ***Business/corporate plan*** is developed that sets out tactics, resource implications, timeframes,

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	production and sales target.
2. Develop new products/ markets.	2.1 Alternative product/service offerings are canvassed and studied for feasibility. 2.2 Potential and new sources/sellers of supplies and raw materials are identified and canvassed. 2.3 Target markets and buyers are identified and surveyed as to their preferences and brand loyalties.
3. Expand customers and product lines	3.1 Enterprise is built up and sustained through responsiveness to market demands and the regulatory environment. 3.2 Competitive advantage of existing products and services is maintained/enhanced through responsive advocacies and strategies. 3.3 Constant listening to stakeholder/client feedback is ensured to maintain loyal client base.
4. Motivate staff/workers.	4.1 Regular dialogue is established and maintained in all levels and relevant sections of the enterprise. 4.2 Flow of communications in both directions is encouraged. 4.3 Helpful mechanisms and benefits are implemented. 4.4 Issues/problems are proactively resolved

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	through win-win solutions wherever practicable.
5. Expand employed capital base.	5.1 Capital employed in business is continuously reviewed as per the strategic plan. 5.2 Business share holdings are reviewed in accordance with the type of business. 5.3 Capital employed is expanded according to organization procedures. 5.4 Types of shares are determined according to strategic plan. 5.5 Shares diversification process is undertaken as per office procedures. 5.6 Role of shareholders is determined and implemented in accordance organization procedures.
6. Undertake county/ regional business expansion.	6.1 Regions for expansion are continuously reviewed in accordance with strategic plan and company's expansion plan 6.2 County business regulations are reviewed and adhered to in accordance with set procedures. 6.3 Regional laws and regulations are adhered to in accordance with set procedures. 6.4 County/regional business expansion is undertaken in accordance with organization's growth/ expansion plan.

RANGE

This section provides work environment and conditions to which the performance criteria
apply. It allows for different work environment and situations that will affect performance.

Variable	Range
1. Strategic directions may include but not limited to:	1.1 Business continuity and succession 1.2 Resource access security. 1.3 Core competencies development. 1.4 New developments e.g. technological change, new products.
2. Business/Corporate plan may include but not limited to:	2.1 Action steps and responsibilities of departments and individual workers. 2.2 Resource requirements and budget. 2.3 Tactics and strategies to achieve objectives.
3. Helpful mechanisms may include but not limited to:	3.1 Wage and non-wage benefits. 3.2 Employee awards and recognition systems. 3.3 Employee rights and welfare policies. 3.4 Full-disclosure/transparency policies.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Assessing a range of alternative products and strategies.
- Critically analyzing information, summarizing and making sense of previous and current market trends.
- Identifying changing consumer preferences and demographics.
- Thinking "outside the box".
- Ensuring quality consistency.
- Reducing lead time to product/service delivery.
- Managing operations/ production.
- Using formal problem-solving procedures, e. g., root-cause analysis, six sigma.
- Communication skills.
- Applying motivational principles, e. g., positive stroking, and behavior modification.
- Assessing a range of alternatives rather than choosing the easiest option.
- Achieving ownership and credibility for the enterprise vision.
- Critically analyzing information, summarizing and making sense of previous and current market trends.
- Developing solutions and practical strategies which are "outside the box".

Required Knowledge

The individual needs to demonstrate knowledge of:

- Features and benefits of common operational practices, e. g., continuous improvement (kaizen), waste elimination.
- Conflict resolution.

- Health, safety and environment (HSE) principles and requirements.
- Public-relations strategies.
- Basic cost-benefit analysis.
- Basic financial management.
- Business strategic planning.
- Impact of change on individuals, groups and industries.
- Employee assistance.
- Government and regulatory processes.
- Local and international market trends.
- Product promotion strategies.
- Mechanisms in the enterprise.
- Market and feasibility studies.
- Local and global supply chains business models and strategies.
- Government and regulatory processes
- Local and international business environment.
- Concepts of change management.
- Relevant developments in other industries.
- Capital employed.
- Regional/ County business expansion.
- Innovation in business.

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance
criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Demonstrated ability to maintain a profitable and stable enterprise as shown by stakeholder feedback, employee testimonies

	and company financial statements. 1.2 Demonstrated ability to conceptualize and plan a micro/small enterprise 1.3 Demonstrated ability to manage/operate a micro/small-scale business 1.4 Demonstrated basic marketing skills
2. Resource Implications.	The following resources should be provided: 2.1 Interview guide for entrepreneurs. 2.2 Enterprise workers and third parties. 2.3 Materials and location relevant to the proposed activity and tasks.
3. Methods of Assessment.	3.1 Case problems. 3.2 Interview. 3.3 Portfolio. 3.4 Third part reports.
4. Context of Assessment.	4.1 Competency may be assessed in workplace or in a simulated workplace setting. 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group.
5. Guidance information for assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE EMPLOYABILITY SKILLS

UNIT CODE: ENG/OS/EI/BC/04/6

UNIT DESCRIPTON

This unit covers competencies required to demonstrate employability skills. It involves competencies for exuding self-awareness and dealing with everyday life challenges; demonstrating critical safe work habits and leading a workplace team; planning and organizing work activities; applying learning, creativity and innovativeness in workplace functions; pursuing professional growth and managing time effectively in the workplace.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Develop self-awareness and understanding of every day demands and challenges in the workplace.	1.1 Personal vision, mission and goals are formulated based on potential and in relation to organization objectives. 1.2 Emotions are managed as per workplace requirements. 1.3 Thoughts, feelings and beliefs are expressed in direct, honest and appropriate ways. 1.4 Feelings are shared with others according to personal issues for healthy relations. 1.5 Individual performance is evaluated and monitored according to the agreed targets.

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	1.6 Assertiveness is developed and maintained based on the requirements of the job. 1.7 Own ideas and visions that generates excitement, enthusiasm and commitment are articulated. 1.8 Accountability and responsibility for own actions are demonstrated. 1.9 Self-esteem and a positive self-image are developed and maintained.
2. Demonstrate critical safe work habits for employees in the workplace.	2.1 Stress is managed at the workplace in accordance with workplace procedures. 2.2 Punctuality and time consciousness is demonstrated in line workplace policy. 2.3 Personal objectives are integrated with organization goals in accordance with organization's strategic plan. 2.4 Resources are effectively utilized in accordance with workplace policy. 2.5 Work priorities are set and met in according to workplace procedures. 2.6 Leisure time is recognized and used productively in line with organization policy. 2.7 Abstinence from drug and substance abuse is demonstrated as per workplace policy. 2.8 Awareness of HIV and AIDS is demonstrated in line with workplace

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	requirements. 2.9 Safety consciousness is demonstrated in the workplace based on organization safety policy. 2.10 Emerging issues are dealt with in accordance with organization policy.
3. Lead a workplace team.	3.1 Role and objectives of the team are determined in accordance workplace policy. 3.2 Team parameters and relationships are identified according to set rules and regulations. 3.3 Individual responsibilities are identified in accordance with work procedures. 3.4 Effective and appropriate forms of communication in a team are established according to office policy. 3.5 Business communication is carried out as per workplace place policy and requirements of the job. 3.6 Team activities are complemented in accordance with office procedures. 3.7 Team building activities are planned for in line with organization policy. 3.8 Conflicts are resolved between team

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	members in line with organization rules and regulations. 3.9 ***Gender mainstreaming*** is undertaken in accordance with set regulations. 3.10 Human rights are adhered to in accordance with existing protocol. 3.11 Healthy relationships are developed and maintained for harmonious co-existence in line with workplace.
4. Plan and organize work.	4.1. Work schedules are developed for accomplishing given tasks within the set time lines and based on workplace policy. 4.2 Time is managed achieve workplace set goals and objectives. 4.3 Clear project goals and deliverables are established according to company set policies and regulations. 4.4 Resources are mobilized, allocated and utilized to meet project goals and deliverables. 4.5 Work activities are monitored and evaluated in line with organization procedures. 4.6 Situations that require decision making are identified within the work place and decision made in accordance with workplace policy. 4.7 Steps required in making effective decisions

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	are applied within the workplace. 4.8 Problems arising in the course of working are identified and solved or reported according the workplace policies and procedures. 4.9 Values required in problem solving process are demonstrated at the work place. 4.10 Situations within the workplace that require negotiation identified and negotiations done to create win-win situations. 4.11 Negotiation techniques are developed and applied at workplace to meet clientele's satisfaction and organizations' objectives.
5. Maintain professional growth and development in the workplace.	5.1 Personal training needs are assessed and identified in line with the requirements of the job. 5.2 ***Training and career opportunities*** are identified and availed based on job requirements. 5.3 Resources for training are mobilized and allocated based organizations skills needs. 5.4 Licensees and certifications relevant to job and career are obtained and renewed. 5.5 Personal growth is pursued towards improving the qualifications set for the profession. 5.6 Work priorities and commitments are

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	managed based on requirement of the job and workplace policy. 5.7 Recognitions are sought as proof of career advancement in line with professional requirements.
6. Demonstrate learning, creativity and innovativeness in the workplace	6.1 Time and effort is invested in learning new skills based job requirements. 6.2 Willingness to learn in different context is demonstrated based on available learning opportunities arising in the workplace. 6.3 Learning opportunities are sought and allocated based on job requirement and in line with organization policy. 6.4 Application of learning is demonstrated in both technical and non-technical aspects based on requirements of the job. 6.5 Application of a range of basic IT skills is demonstrated based on requirements of the job. 6.6 Awareness of Occupational Health and Safety procedures are demonstrated in use of technology in the workplace. 6.7 Initiative is taken to create more effective and efficient processes and procedures in line with workplace policy. 6.8 New systems are developed and maintained

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	in accordance with the requirements of the job. 6.9 Opportunities that are not obvious are identified and exploited in line with organization objectives. 6.10 Opportunities for performance improvement are identified proactively in area of work. 6.11 Awareness of personal role in workplace innovation is demonstrated.

DEMONSTRATE ENVIRONMENTAL LITERACY

UNIT CODE: ENG/OS/AUT/BC/5/6

UNIT DESCRIPTION

This unit specifies the competencies required to follow procedures for environmental hazard control, follow procedures for environmental pollution control, comply with workplace sustainable resource use, evaluate current practices in relation to resource usage, develop and adhere to environmental protection principles/strategies/guidelines, analyze resource use, develop resource conservation plans and implement selected plans.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace functions.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Control environmental hazard.	1.1 Storage methods for environmentally hazardous materials are strictly followed according to environmental regulations and OSHS. 1.2 Disposal methods of hazardous wastes are followed at all times according to environmental regulations and OSHS. 1.3 PPE is used according to OSHS.
2. Control environmental	2.1 Environmental pollution ***control***

ELEMENT These describe the key outcomes which make up workplace functions.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
Pollution control.	***measures*** are compiled following standard protocol. 2.2 Procedures for solid waste management are observed according Environmental Management and Coordination Act 1999. 2.3 Methods for minimizing ***noise pollution*** complied following environmental regulations.
3. Demonstrate sustainable resource use.	3.1 Methods for minimizing wastage are complied with. 3.2 Waste management procedures are employed following principles of 3Rs (Reduce, Reuse, and Recycle). 3.3 Methods for economizing or reducing resource consumption are practiced.
4. Evaluate current practices in relation to resource usage.	4.1 Information on resource efficiency systems and procedures are collected and provided to the work group where appropriate. 4.2 Current resource usage is measured and recorded by members of the work group. 4.3 Current purchasing strategies are

ELEMENT These describe the key outcomes which make up workplace functions.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	analyzed and recorded according to industry procedures. 4.4 Current work processes to access information and data is analyzed following enterprise protocol.
5. Identify Environmental legislations/conventions for environmental concerns.	5.1 Environmental legislations/conventions and local ordinances are identified according to the different environmental aspects/impact 5.2 Industrial standard/environmental practices are described according to the different environmental concerns
6. Implement specific environmental programs.	6.1 Programs/Activities are identified according to organizations policies and guidelines. 6.2 Individual roles/responsibilities are determined and performed based on the activities identified. 6.3 Problems/constraints encountered are resolved in accordance with organizations' policies and guidelines 6.4 Stakeholders are consulted based on

ELEMENT These describe the key outcomes which make up workplace functions.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	company guidelines
7. Monitor activities on Environmental protection/Programs.	7.1 Activities are periodically monitored and Evaluated according to the objectives of the environmental program. 7.2 Feedback from stakeholders are gathered and considered in Proposing enhancements to the program based on consultations. 7.3 Data gathered are analyzed based on Evaluation requirements. 7.4 Recommendations are submitted based on the findings 7.5 Management support systems are set/established to sustain and enhance the program. 7.6 Environmental incidents are monitored and reported to concerned/proper authorities.
8. Analyze resource use.	8.1 All resource consuming processes are identified. 8.2 Quantity and nature of Resource consumed is determined 8.3 Resource flow is analysed through different parts of the process.

ELEMENT These describe the key outcomes which make up workplace functions.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	8.4 Waste is classified for possible source of resources.
9. Develop resource Conservation plans.	9.1 Efficiency of use/conversion of resources is determined following industry protocol. 9.2 Causes of low efficiency of use of resources are determined based on industry protocol. 9.3 Plans for increasing the efficiency of resource use are developed based on findings.

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. PPE may include but not limited to:	1.1 Mask. 1.2 Gloves. 1.3 Goggles. 1.4 Safety hat. 1.5 Overall. 1.6 Hearing protector.
2. Environmental pollution control measures may include but not limited to:	2.1 Methods for minimizing or stopping spread and ingestion of airborne particles. 2.2 Methods for minimizing or stopping spread and ingestion of gases and fumes. 2.4 Methods for minimizing or stopping spread and ingestion of liquid wastes.
3. Wastes may include but not limited to:	3.1 Unnecessary waste. 3.2 Necessary waste.
4. Waste management Procedures may include but not limited to:	4.1 Sorting. 4.2 Storing of items. 4.2 Recycling of items. 4.3 Disposal of items.

Variable	Range
5. Resources may include but not limited to:	5.1 Electric. 5.2 Water. 5.3 Fuel. 5.4 Telecommunications. 5.5 Supplies. 5.6 Materials.
6. Workplace environmental Hazards may include but not limited to:	6.1Biological hazards. 6.2 Chemical and dust hazards. 6.3 Physical hazards.
7. Organizational systems and procedures may include but not limited to:	7.1 Supply chain, procurement and purchasing. 7.2 Quality assurance. 7.3 Making recommendations and seeking approvals.
8. Legislations/Conventions may include but not limited to:	8.1 EMCA 1999. 8.2 Montreal Protocol. 8.3 Kyoto Protocol.
9. Environmental aspects/impacts may include but not limited to:	9.1 Air pollution. 9.2 Water pollution. 9.3 Noise pollution. 9.4 Solid waste. 9.5 Flood control. 9.6 Deforestation/Denudation. 9.7 Radiation/Nuclear /Radio Frequency/ Microwaves. 9.8 Situation. 9.9 Soil erosion (e.g. Quarrying, Mining, etc.). 9.10 Coral reef/marine life protection.

Variable	Range
10. Industrial standards / environmental practices may include but not limited to:	10.1 ISO standards. 10.2 Company environmental management systems (EMS)
11. Periodic may include but not limited to:	11.1 Hourly. 11.2 Daily 11.3 Weekly 11.4 Monthly 11.5 Quarterly 11.6 Yearly
12. Programs/Activities may include but not limited to:	12.1 Waste disposal (on-site and offsite). 12.2 Repair and maintenance of equipment. 12.3 Treatment and disposal operations. 12.4 Clean-up activities. 12.5 Laboratory and analytical test. 12.6 Monitoring and evaluation. 12.7 Environmental advocacy programs.

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1.Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Controlled environmental hazard. 1.2 Controlled environmental pollution. 1.3 Demonstrated sustainable resource use. 1.4 Evaluated current practices in relation to resource

	usage. 1.5 Demonstrated knowledge of environmental legislations and local ordinances according to the different environmental issues /concerns. 1.6 Described industrial standard environmental practices according to the different environmental issues/concerns. 1.7 Resolved problems/ constraints encountered based on management standard procedures. 1.8 Implemented and monitored environmental practices on a periodic basis as per company guidelines. 1.9 Recommended solutions for the improvement of the program 1.10 Monitored and reported to proper authorities any environmental incidents.
2. Resource Implications.	The following resources should be provided: 2.1 Workplace with storage facilities 2.2 Tools, materials and equipment relevant to the tasks (e.g. Cleaning tools, cleaning materials, trash bags) 2.3 PPE, manuals and references 2.4 Legislation, policies, procedures, protocols and local ordinances relating to environmental protection 2.5 Case studies/scenarios relating to environmental Protection
3 Methods of Assessment.	Competency in this unit may be assessed through: 3.1 Demonstration. 3.2 Oral questioning. 3.3 Written examination. 3.4 Interview/Third Party Reports.

		3.5 Portfolio (citations/awards from GOs and NGOs, certificate of training – local and abroad). 3.6 Simulations and role-play.
4	Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5	Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Following storage methods of environmentally hazardous materials.
- Following disposal methods of hazardous wastes.
- Using PPE.
- Practicing OSHS.
- Complying environmental pollution control.
- Observing solid waste management.
- Complying methods of minimizing noise Pollution.
- Complying methods of minimizing wastage.
- Employing waste management procedures.
- Economizing resource consumption.
- Listing of resources used.
- Measuring current usage of resources.
- Identifying and reporting workplace environmental hazards.
- Conveying all environmental issues.

- Following environmental regulations.
- Identifying environmental regulations.
- Assessing procedures for assessing compliance.
- Collecting information on environmental and resource efficiency systems and procedures, and providing information to the work group.
- Measuring and recording current resource usage.
- Analysing and recording current purchasing strategies.
- Analysing current work processes to access information and data and assisting identifying areas for improvement.
- Analysing resource flow.
- Determining efficiency of use/conversion of resources.
- Determining causes of low efficiency of use.
- Developing plans for increasing the efficiency of resource use.
- Checking resource use plans.
- Complying with regulations/licensing requirements.
- Determining benefit/cost of plans.
- Ranking proposals based on benefit/cost compared to limited resources.
- Checking proposals meet regulatory requirements.
- Monitoring implementation.
- Making adjustments to plan and implementation.
- Checking new resource usage.

Required Knowledge

The individual needs to demonstrate knowledge of:

- Storage methods of environmentally hazardous materials.
- Disposal methods of hazardous wastes.
- Usage of PPE Environmental regulations.
- OSHS.

- Types of pollution.
- Environmental pollution control measures.
- Different solid wastes
- Solid waste management.
- Different noise pollution.
- Methods of minimizing noise pollution.
- Methods of minimizing wastage.
- Waste management procedures.
- Economizing of resource consumption.
- Principle of 3Rs.
- Types of resources.
- Techniques in measuring current usage of resources.
- Calculating current usage of resources.
- Types of workplace environmental hazards.
- Environmental regulations.
- Environmental regulations applying to the enterprise.
- Procedures for assessing compliance with environmental regulations.
- 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 current work processes to access information and data Analysis of data and information.
- Identification of areas for improvement.
- Resource consuming processes.
- Determination of quantity and nature of resource consumed
- Analysis of resource flow of different parts of the resource flow process.
- Use/conversion of resources.
- Causes of low efficiency of use.

- Increasing the efficiency of resource use.
- Inspection of resource use plans
- Regulations/licensing requirements
- Determine benefit/cost for alternative resource sources.
- Benefit/costs for different alternatives.
- Components of proposals
- Criteria on ranking proposals.
- Regulatory requirements.
- Proposals for improving resource efficiency.
- Implementation of resource efficiency plans.
- Procedures in monitor implementation.
- Adjustments of implementation plan.
- Inspection of new resource usage.

DEMONSTRATE OCCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE: ENG/OS/EI/BC/06/6

UNIT DESCRIPTION

This unit specifies the competencies required to lead the implementation of workplace safety and health program, procedures and policies/guidelines.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Identify workplace hazards	1.1 ***Hazards*** in the workplace and/or its ***indicators*** of its presence are identified. 1.2 ***Evaluation and/or work environment*** measurements of OSH hazards/risk existing in the workplace is conducted by authorized personnel or agency. 1.3 ***OSH issues and/or concerns*** raised by workers are gathered.
1. Identify and implement appropriate control measures	2.1 ***Prevention and control measures***, including use of safety ***gears / PPE (personal protective equipment)*** for specific hazards

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	identified and implemented. 2.2 Appropriate ***risk controls*** based on result of OSH hazard evaluation is recommended. 2.3 ***Contingency measures***, including ***emergency procedures*** during workplace ***incidents and emergencies*** are recognized and established in accordance with organization procedures.
2. Implement OSH programs, procedures and policies/ guidelines	3.1 Information to work team about company OSH program, procedures and policies/guidelines are provided. 3.2 Implementation of OSH procedures and policies/ guidelines are participated. 3.3 Team members are trained and advised on OSH standards and procedures. 3.4 Procedures for maintaining ***OSH-related records*** are implemented.

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Hazards may include but are not limited to:	1.1. Physical hazards – impact, illumination, pressure, noise, vibration, extreme temperature, radiation. 1.2 Biological hazards- bacteria, viruses, plants, parasites, mites, molds, fungi, and insects. 1.3 Chemical hazards – dusts, fibres, mists, fumes, smoke, gasses, and vapours. 1.4 Egonomics; Psychological factors – over exertion/ excessive force, awkward/static positions, fatigue, direct pressure, varying metabolic cycles; Physiological factors – monotony, personal relationship, work out cycle; 1.6 Safety hazards (unsafe workplace condition) – confined space, excavations, falling objects, gas leaks, electrical, poor storage of materials and waste, spillage, waste and debris; 1.7 Unsafe workers' act (Smoking in off-limited areas, Substance and alcohol abuse at work);

Variable	Range
2. Indicators may include but are not limited to:	2.1 Increased of incidents of accidents, injuries; 2.2 Increased occurrence of sickness or health complaints/ symptoms; 2.3 Common complaints of workers' related to OSH; 2.4 High absenteeism for work-related reasons;
3. Evaluation and/or work environment measurements may include but are not limited to:	3.1 Health Audit; 3.2 Safety Audit; 3.3 Work Safety and Health Evaluation; 3.4 Work Environment Measurements of Physical and Chemical Hazards.
4. OSH issues and/or concerns may include but are not limited to:	4.1 Workers' experience/observance on presence of work hazards. 4.2 Unsafe/unhealthy administrative arrangements (prolonged work hours, no break time, constant overtime, scheduling of tasks). 4.3 Reasons for compliance/non-compliance to use of PPEs or other OSH procedures/policies/guidelines.

Variable	Range
5. Prevention and control measures may include but are not limited to:	5.1 Eliminate the hazard (i.e. get rid of the dangerous machine 5.2 Isolate the hazard (i.e. keep the machine in a closed room and operate it remotely; barricade an unsafe area off) 5.3 Substitute the hazard with a safer alternative (i.e., replace the machine with a safer one). 5.4 Use administrative controls to reduce the risk (i.e. give trainings on how to use equipment safely; OSH-related topics, issue warning signage, rotation/shifting work schedule). 5.5 Use engineering controls to reduce the risk (i.e. use safety guards to machine). 5.6 Use personal protective equipment. 5.7 Safety, Health and Work Environment Evaluation. 5.8 Periodic and/or special medical examinations of workers.
6. Safety gears /PPE (Personal Protective Equipment) may include but are not limited to:	6.1 Arm/Hand guard, gloves. 6.2 Eye protection (goggles, shield). 6.3 Hearing protection (ear muffs, ear plugs). 6.4 Hair Net/cap/bonnet. 6.5 Hard hat. 6.6 Face protection (mask, shield). 6.7 Apron/Gown/coverall/jump suit. 6.8 Anti-static suits. 6.9 High-visibility reflective vest.

Variable	Range
7. Appropriate risk controls	Appropriate risk controls in order of impact are as follows: 7.1 Eliminate the hazard altogether (i.e., get rid of the dangerous machine). 7.2 Isolate the hazard from anyone who could be harmed (i.e., keep the machine in a closed room and operate it remotely; barricade an unsafe area off). 7.3 Substitute the hazard with a safer alternative (i.e. replace the machine with a safer one). 7.4 Use administrative controls to reduce the risk (i.e. train workers how to use equipment safely; train workers about the risks of harassment; issue signage). 7.5 Use engineering controls to reduce the risk (i.e., attach guards to the machine to protect users). 7.6 Use personal protective equipment (i.e. wear gloves and goggles when using the machine)
8. Contingency measures may include but are not limited to:	8.1 Evacuation. 8.2 Isolation. 8.3 Decontamination. 8.4 (Calling designed) emergency personnel.

Variable	Range
9. Emergency procedures may include but are not limited to:	9.1 Fire drill. 9.2 Earthquake drill. 9.3 Basic life support/CPR. 9.4 First aid. 9.5 Spillage control. 9.6 Decontamination of chemical and toxic 9.7 Disaster preparedness/management 9.8 Set of fire-extinguisher.
10. Incidents and emergencies may include but are not limited to:	10.1 Chemical spills. 10.2 Equipment/vehicle accidents. 10.3 Explosion 10.4 Fire 10.5 Gas leak. 10.6 Injury to personnel. 10.7 Structural collapse. 10.8 Toxic and/or flammable vapours emission.
11. OSH-related Records may include but are not limited to:	11.1 Medical/Health records. 11.2 Incident/accident reports. 11.3 Sickness notifications/sick leave application. 11.4 OSH-related trainings obtained

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Skills on preliminary identification of workplace hazards/risks
- Knowledge management.
- Critical thinking skills.
- Observation skills.
- Coordinating skills.
- Communication skills.
- Interpersonal skills.
- Troubleshooting skills.
- Presentation skills.
- Training skills.

Required Knowledge

The individual needs to demonstrate knowledge of:

- General OSH Principles.
- Occupational hazards/risks recognition.
- OSH organizations providing services on OSH evaluation and/or work environment measurements (WEM).
- National OSH regulations; company OSH policies and protocols.
- Systematic gathering of OSH issues and concerns.
- General OSH principles.
- National OSH regulations.
- Company OSH and recording protocols, procedures and
- Policies/guidelines.
- Training and/or counselling methodologies and strategies.

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identifies hazards/risks in the workplace and/or its indicators. 1.2 Requests for evaluation and/or work environment measurements of OSH hazards/risk in the workplace. 1.3 Gathers OSH issues and/or concerns raised by workers. 1.4 Identifies and implements prevention and control measures, including use of PPE (personal protective equipment) for specific hazards. 1.5 Recommends appropriate risk controls based on result of OSH hazard evaluation and OSH issues gathered. 1.6 Establish contingency measures, including emergency procedures in accordance with organization procedures. 1.7 Provides information to work team about company OSH program, procedures and policies/guidelines. 1.8 Participates in the implementation of OSH procedures and policies/guidelines. 1.9 Trains and advises team members on OSH standards and procedures. 1.10 Implements procedures for maintaining OSH-related records.
2. Resource	The following resources should be provided:

Implications.	2.1 Workplace or assessment location. 2.2 OSH personal records. 2.3 PPE. 2.4 Health records.
3. Methods of Assessment.	Competency may be assessed through: 3.1 Portfolio Assessment. 3.2 Interview. 3.3 Case Study/Situation. 3.4 Observation/Demonstration and oral questioning.
4. Context of Assessment.	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

COMMON UNITS OF COMPETENCY

PREPARE AND INTERPRET TECHNICAL DRAWINGS

UNIT CODE: ENG/OS/AUT/CC/1/6

UNIT DESCRIPTION

This unit covers the competencies required to prepare and interpret technical drawings. 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 packages.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Use and maintain drawing equipment and materials	1.1 ***Drawing equipment*** are identified and gathered according to task requirements 1.2 ***Drawing materials*** are identified and gathered according to task requirements 1.3 Drawing equipment are used and maintained as per manufacturer's instructions 1.4 Drawing materials are used as per workplace procedures

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	1.5 Waste materials are disposed in accordance with workplace procedures and ***environmental legislations*** 1.6 ***Personal Protective Equipment*** is used according to occupational safety and health regulations
2. Produce plain geometry drawings	2.1 Different types of lines used in drawing and their meanings are identified according to standard drawing conventions 2.2 Different types of ***geometric forms*** are constructed according to standard drawing conventions 2.3 Different types of angles are constructed according to principles of trigonometry 2.4 Different types of angles are measured using appropriate measuring tools 2.5 Angles are bisected according to standard drawing conventions
3. Produce solid geometry drawings	3.1 Sketches and drawings of patterns are interpreted according to standard conventions

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	3.2 Patterns are developed in accordance with standard conventions
4. Produce pictorial and orthographic drawings of components	4.1 Different symbols and abbreviations are identified and their meaning interpreted according to standard drawing conventions 4.2 Isometric sketches and drawings of components are interpreted and produced in accordance with the standard conventions of isometric drawings 4.3 First and third angle orthographic sketches and drawings of components are interpreted and produced in accordance with the standard conventions of orthographic drawings 4.4 Freehand sketching of different types of geometric forms, tools, equipment, diagrams and components is conducted
5. Produce assembly drawings	5.1 Orthographic views are exploded according to standard conventions of orthographic drawings. 5.2 Pictorial views are exploded

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	according to standard conventions of orthographic drawings. 5.3 Part lists are identified according to part to be produced 5.4 Sectional views are produced according to standard conventions of drawing. 5.5 Produced drawing is hatched according to standard conventions of drawings.
6. Apply CAD packages in drawing	6.1 CAD packages are selected according to task requirements 6.2 CAD packages are applied in production of engine parts, electrical and electronic circuits and vehicle body parts drawings

RANGE

Variable	Range
1. Drawing equipment may include but not limited to:	1.1 Drawing boards 1.2 T-square 1.3 Set squares 1.4 Drawing set 1.5 Computers with CAD packages
2. Drawing materials may include but not limited to:	2.1 Drawing papers 2.2 Pencils 2.3 Erasers 2.4 Masking tapes 2.5 Paper clips
3. Environmental legislations may include but not limited to:	EMCA 1999
4. Personal Protective Equipment may include but not limited to:	4.1 Dust coats 4.2 Closed leather shoes 4.3 Goggles for CAD
5. Geometric forms may include but not limited to:	5.1 Circles 5.2 Triangles 5.3 Rectangles 5.4 Parallelogram 5.5 Polygons 5.6 Pyramids 5.7 Conic sections 5.8 Prisms 5.9 Loci
6. Standard drawing conventions may include but not limited to:	6.1 Anatomy of engineering drawing (title block, coordinate grid system, revision block, notes and legends) 6.2 Drawing scale (paper size and

	drawing symbols) international drawing standards

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required skills

The individual needs to demonstrate the following skills:

- Critical thinking
- Drawing
- Interpretation
- Drawing equipment handling
- Analysis and synthesis
- Communication
- Inter personal

Required knowledge

The individual needs to demonstrate knowledge of:

- Drawing equipment and materials
- Freehand sketching
- Lettering
- Geometrical constructions
- Types of drawings
- Types of lines
- Isometric drawing conventions, features, characteristics, components
- Orthographic drawing conventions, features, characteristics, components
- Sketches and drawings of simple patterns

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Applied and adhered to safety procedures 1.2 Cared and maintained drawing equipment 1.3 Interpreted circuit, assembly and lay out diagrams 1.4 Applied appropriate technical standards, used proper tools and equipment for a given task 1.5 Produced sketches and drawings 1.6 Applied CAD packages in production of drawings
2. Resource Implications	Resources the same as that of workplace are advised to be applied. 2.1 Drawing room 2.2 Drawing equipment and materials 2.3 Computers 2.4 CAD packages
3. Methods of Assessment	Competency may be assessed through: 3.1 Practical tests 3.2 Observation
4. Context of Assessment	Competency may be assessed individually in the actual workplace or a simulated work place setting.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

APPLY ENGINEERING MATHEMATICS

UNIT CODE: ENG/AUT/CC/2/6

UNIT DESCRIPTION:

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

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range.***
1. Apply Algebra	1.1 Calculations involving Indices are performed as per the concept 1.2 Calculations involving Logarithms are performed as per the concept 1.3 Scientific calculator is used in solving mathematical problems in line with manufacturer's manual 1.4 Simultaneous equations are performed as per the rules 1.5 Quadratic equations are calculated as per the concept

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range.***
2. Apply Trigonometry and hyperbolic functions	2.1 Calculations are performed using trigonometric rules 2.2 Calculations are performed using hyperbolic functions
3. Apply complex numbers	1.1 Complex numbers are represented using Argand diagrams 1.2 Operations involving complex numbers are performed 1.3 Calculations involving complex numbers are performed using De Moivre's theorem
4. Apply Coordinate Geometry	4.1 Polar equations are calculated using coordinate geometry 4.2 Graphs of given polar equations are drawn using the Cartesian plane 4.3 Normal and tangents are determined using coordinate geometry
5. Carry out Binomial Expansion	5.1 Roots of numbers are determined using binomial theorem 5.2 Errors of small changes are determined using binomial theorem

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range.***
6. Apply Calculus	6.1 Derivatives of functions are determined using Differentiation 6.2 Derivatives of hyperbolic functions are determined using Differentiation 6.3 Derivatives of inverse trigonometric functions are determined using Differentiation 6.4 Rate of change and small change are determined using Differentiation. 6.5 Calculation involving stationery points of functions of two variables are performed using differentiation. 6.6 Integrals of algebraic functions are determined using integration 6.7 Integrals of trigonometric functions are determined using integration 6.8 Integrals of logarithmic functions are determined using integration 6.9 Integrals of hyperbolic and inverse functions are determined using integration
7. Solve Ordinary differential equations	7.1 First order and second order differential equations are solved using the method of undetermined coefficients 7.2 First order and second order

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range.***
	differential equations are solved from given boundary conditions
8. Carry out Mensuration	8.1 Perimeter and areas of figures are obtained 8.2 Volume and of Surface area of solids are obtained 8.3 Area of irregular figures are obtained 8.4 Areas and volumes are obtained using Pappus theorem
9. Apply Power Series	9.1 Power series are obtained using Taylor's Theorem 9.2 Power series are obtained using McLaurin's 's theorem
10. Apply Statistics	10.1 Mean, median ,mode and Standard deviation are obtained from given data 10.2 Calculations are performed based on Laws of probability 10.3Calculation involving probability distributions , mathematical expectation sampling distributions are performed 10.4 Sampling distribution methods are applied in data analysis 10.5 Calculations involving use of standard normal table, sampling

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range.***
	distribution, T-distribution and estimation are done 10.6 Confidence intervals are determined
11. Apply Numerical methods	11.1 Roots of polynomials are obtained using iterative *numerical methods* 11.2 Interpolation and extrapolation are performed using numerical methods
12. Apply Vector theory	12.1 Vectors and scalar quantities are obtained in two and three dimensions 12.2 *Operations* on vectors are performed 12.3 Position of vectors is obtained 12.4 Resolution of vectors is done
13. Apply Matrix	13.1Determinant and inverse of 3x3 matrix are obtained 13.2Solutions of simultaneous equations are obtained 13.3Calculation involving Eigen values and Eigen vectors are performed

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Operations may include but not limited to:	1.1. Addition 1.2. Subtraction
2. Hyperbolic functions may include but not limited to:	2.1. Sinh x 2.2. Cosh x 2.3. Cosec x 2.4. Coth x 2.5. Tanh x 2.6. Sech x
3. Probability Distributions may include but not limited to:	3.1. Binomial 3.2. Poisson 3.3. Normal
4. Numerical Methods may include but not limited to:	4.1. Newton Raphson 4.2. Gregory Newton

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Applying fundamental operations (addition, subtraction, division, multiplication)
- Using and applying mathematical formulas
- Logical thinking
- Problem solving
- Applying statistics

- Drawing graphs
- Using different measuring tools

Required knowledge

The individual needs to demonstrate knowledge of:

- Fundamental operations (addition, subtraction, division, multiplication)
- Calculating area and volume
- Types and purpose of measuring instruments
- Units of measurement and abbreviations
- Rounding techniques
- Types of fractions
- Types of tables and graphs
- Presentation of data in tables and graphs
- Vector operations
- Matrix operations

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.4 Applied Trigonometry and hyperbolic functions 1.5 Applied complex numbers 1.6 Applied Calculus 1.7 Solved Ordinary differential equations 1.8 Carried out mensuration 1.9 Applied Power Series 1.10 Applied Vector theory

	1.11 Applied Matrix 1.12 Applied Numerical methods
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Measuring equipment 2.3 Materials relevant to the proposed activity or tasks
3. Methods of Assessment	Competency in this unit may be assessed through: 1.1 Direct Observation 1.2 Demonstration with Oral Questioning 1.3 Written tests
4. Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

APPLY AUTOMOTIVE ENGINEERING SCIENCE PRINCIPLES

UNIT CODE: ENG/OS/AUT/CC/3/06

UNIT DESCRIPTION

This unit describes the competencies required by a technician in order to apply a wide range of automotive science principles in their work. It includes using concepts of science, resolution of forces, determining effects of various loads on engineering systems, analyse properties of materials, determine parameters of a fluid system, describe the nature of friction and apply the gas laws.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***.
1. Resolve forces	1.1 Forces are defined as per reference 1.2 Theorems are stated and explained 1.3 Forces are resolved as per theorems 1.4 Resultant forces are determined as per the methods.
2. Determine effects of loads in automotive systems.	2.1 ***Types of forces*** are identified 2.2 Equilibrium of forces and plane framework are calculated 2.3 Point loads are analyzed as per procedure. 2.4 Principle of moments is stated as per reference

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***.
3. Analyse properties of materials	3.1 ***Mechanical properties and stress*** are identified in accordance with standard 3.2 Mechanical properties of a materials are tested as per procedure 3.3 Direct, shear and torsion stresses are calculated as per formula 3.4 Factors affecting choice of materials are identified
4. Determine the nature of friction in automotive systems	4.1 Friction is defined from reference 4.2 Laws of friction are stated as per reference 4.3 Effects of friction are identified from experiments 4.4 Forces to overcome friction are calculated for various situations 4.5 Tools and equipment are operated
5. Solve problems related to motion.	5.1 Terms are defined according to reference 5.2 Laws of motion are stated as per reference 5.3 Parameters of motion are calculated. 5.4 Motion graphs are drawn for

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***.
	different situations. 5.5 Relationship between linear and angular motion is established from formula 5.6 Motion of a vehicle on a curved and banked track is analysed as per the laws of motion.
6. Apply simple machines concepts	6.1 Terms related to machines are defined from reference 6.2 Simple machines are described from design. 6.3 The law of machine is applied from formula 6.4 Machines performance indicators are determined from law
7. Determine the effect of heat and apply the gas laws	7.1 Terms are defined in accordance with reference 7.2 Effects of heat on matter are identified from experiments. 7.3 Modes of heat transfer are identified from observation 7.4 Gas laws are stated from reference 7.5 Quantity of heat and temperature are measured using instruments 7.6 Problems on heat and gases are

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***.
	calculated from formula
8. Use the concept of density and pressure	8.1 Terms are defined from reference 8.2 Parameters are measured using instruments 8.3 Laws and principles are stated in accordance with reference 8.4 Calculations on density and pressure are performed from derived formula 8.5 Concepts of pressure and density are applied in vehicle systems

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Mechanical systems may include but not limited to:	1.1 Pulleys 1.2 Levers 1.3 Wedge 1.4 Screws 1.5 Wheel and axle 1.6 Inclined plane
2. Principles may include but not limited to:	2.1 Newton's laws of motion 2.2 Law of conservation of

Variable	Range
	momentum 2.3 Law of conservation of energy 2.4 Archimedes' principle 2.5 Triangle of forces theorem 2.6 Parallelogram of forces law 2.7 Polygon of forces theorem 2.8 Principle of moments 2.9 Bow's notation 2.10 Gas laws
3. Calculations may include but not limited to:	3.1 Mechanical advantage 3.2 Velocity ratio 3.3 Efficiency 3.4 Torque 3.5 Power/Energy 3.6 Work 3.7 Quantity of heat 3.8 Velocity and acceleration 3.9 Stress and strain
4. Types of forces may include but not limited to:	4.1 Friction 4.2 Centrifugal 4.3 Centripetal 4.4 Gravitational 4.5 Inertia 4.6 Shear
5. Properties of materials may include but not limited to:	5.1 Elasticity 5.2 Tensile strength 5.3 Young modulus 5.4 Brittleness

Variable	Range
	5.5 Compressive strength 5.6 Shear strength 5.7 Plasticity 5.8 Modulus of rigidity
6. Parameters may include but not limited to:	6.1 Density 6.2 Temperature 6.3 Viscosity 6.4 Pressure
7. Power transmission systems may include but not limited to:	7.1 Pulleys 7.2 Clutches 7.3 Gears 7.4 Winches 7.5 Chains 7.6 Belts

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Apply basic automotive engineering formulas
- Use of basic mechanical machines
- Perform various unit conversions of engineering quantities
- Basic mechanical systems design
- simple machine operations
- Logical thinking
- Problem solving
- Drawing graphs
- Using different measuring tools

Required knowledge

The individual needs to demonstrate knowledge of:

- Newton's laws of motion
- Levers and pulleys
- Gear trains
- Laws of conservation of energy
- Laws of friction
- Types of forces
- Calculation of pressure and density
- Mechanical advantage and efficiency calculations
- Properties of materials
- Gas laws
- SI units of mechanical energy.
- Power transmission systems
- Operation of mechanical machines
- Mechanical calculation of power, energy, work done, torque and safety factor
- Units of measurement, conversions and abbreviations

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified Mechanical systems 1.2 Identified Principles of automotive science 1.3 Performed mechanical calculations of a system 1.4 Identified types of forces on a system

	1.5 Calculated resultant forces on plane framework 1.6 Identified application of forces on automotive systems 1.7 Tested mechanical properties of a materials 1.8 Identified tools and equipment for measuring system parameters 1.9 Recorded and interpreted measured parameters. 1.10 Operated Power transmission systems
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Measuring tools and equipment 2.3 Sample materials to be tested
3. Methods of Assessment	Competency in this unit may be assessed through: 1.1 Direct Observation 1.2 Demonstration with Oral Questioning 1.3 Case studies 1.4 Written tests
4. Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

APPLY WORKSHOP TECHNOLOGY PRINCIPLES

UNIT CODE: ENG/OS/AUT/CC/4 /06

UNIT DESCRIPTION

This unit describes the competencies required by an automotive technician in order to apply a wide range of workshop technology skills in their work. It involves use of different methods to produce work pieces using basic tools while observing occupational safety and health legislations, regulations and safe working practices, interpret working drawings, select appropriate techniques for a given task to achieve specified results as well as perform housekeeping.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Use technical drawing to plan work operations	1.1 Technical drawings and geometric symbols are read and interpreted as per ***drawing standards.*** 1.2 ***Operation Plan*** is produced as per the technical drawings. 1.3 Technical drawings are produced ***as*** per drawing Standards.
2. Choose appropriate tools and materials	2.1 Working tools, equipment and materials are selected for the task. 2.2 The work areas are tidied up as per organization policy.

ELEMENT These describe the key outcomes which make up workplace function	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
3. Measure and mark out dimensions on workpieces	3.1 Measuring tools suitable for the work are selected 3.2 Measuring tools are inspected and calibrated if required 3.3 Dimensions are marked on the workpiece as per the working drawing.
4. Use hand tools to cut and file parts	4.1 ***Hand tools*** are selected based on operation plan 4.2 Workpiece is cut to specification 4.3 Workpiece is filed to specification 4.4 Part are produced to ***specifications***
5. Use drills to make holes	5.1 Hole centers are marked and center punched as per operation plan. 5.2 Drill bits are selected and mounted 5.3 Workpiece is mounted and clamped 5.4 ***Hole is drilled*** to specification 5.5 Holes inspected to ***specification***
6. Thread using taps and dies	6.1 Taps and dies selected based on operation plan. 6.2 Taps and dies are set up on the work piece 6.3 ***Threads are*** cut to specification

ELEMENT These describe the key outcomes which make up workplace function	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
7. Produce components using a lathe machine	7.1 Workpieces are turned to specification
8. Assemble metal parts and sub-assemblies	8.1 Parts joined, fitted and assembled 8.2 Final assembly inspected as per specification
9. Polish finished work	9.1 ***Polishing*** material are selected 9.2 Finished work is cleaned 9.3 Finished work is polished to specification
10. Perform housekeeping	10.1 Waste is segregated and disposed as per disposal guidelines. 10.2 Housekeeping is carried out as per workplace requirement
11. Inspect finished work for accuracy and quality	11.1 Inspection tools and methods selected as per operation plan 11.2 Finished work is inspected as per specification 11.3 Adjustments are made based on inspections results
12. Maintenance of tools and equipment	12.1 Machines and tools are inspected 12.2 Machines and tools are lubricated 12.3 Tools are ground to specification 12.4 Faults on machines and tools are identified and reported 12.5 Store tools and equipment

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

VARIABLE	**RANGE**
1. Measuring tools may include but is not limited to:	1.1 Steel rule 1.2 Verniercalliper 1.3 Micrometre screw gauge 1.4 Vernier height gauge 1.5 Combination set 1.6 Bevels
2. Drawing Standards tools may include but is not limited to:	2.1 ISO 2.2 BS 2.3 ANSI
3. Operation Plan tools may include but is not limited to:	3.1 Sequence of operations 3.2 Measuring tools 3.3 Hand tools 3.4 Cutting tools 3.5 Inspection tools
4. Marking out tools tools may include but is not limited to:	4.1 Scribers 4.2 Dividers 4.3 Dot punch 4.4 Centre punch 4.5 Engineers square 4.6 Straight edge 4.7 Surface plate
5. Work holding devices tools may include but is not limited to:	5.1 Bench vice 5.2 V-Block 5.3 Angle plate 5.4 G-clamp

VARIABLE	RANGE
	5.5 Jigs and fixtures 5.6 Hand vice
6. Hand tools may include but is not limited to:	6.1 Files 6.2 Saws 6.3 Hammers 6.4 Chisels 6.5 Taps and dies
7. Machine tools may include but is not limited to:	7.1 Drilling machines 7.2 Lathe machine 7.3 Grinding machine
8. Threads tools may include but is not limited to:	8.1 Internal and external threads 8.2 V-profile threads
9. Polishing tools may include but is not limited to:	9.1 Emery cloth 9.2 Polishing and burnishing machine 9.3 Filing
10. Hole drilled tools may include but is not limited to:	10.1 Location 10.2 Counter sinking 10.3 Counter boring 10.4 Reaming 10.5 Boring
11. Joining tools may include but is not limited to:	11.1 Riveting 11.2 Fastening 11.3 Soldering 11.4 Brazing 11.5 Welding
12. Specifications tools may include but is not limited to:	12.1 Dimensions 12.2 Tolerances 12.3 Geometry 12.4 Surface finish

VARIABLE	RANGE
	12.5 Functionality

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Technical drawing
- Using measuring and inspection tools
- Using hand tools
- Using portable and bench drilling machines
- Soldering and brazing
- Riveting and fastening
- Basic use of the lathe machine
- Using grinding machine

Required Knowledge

The individual needs to demonstrate knowledge and understanding of:

- Occupational Health and Safety Act of Kenya laws 2007 with focus on personal safety, machine safety and workplace
- National Environment Management Authority Act, Kenya 2004
- OSH act
- Equipment manuals
- Basic technical drawing complyingto ISO, ANSI & BS standards
- ISO 1101 Geometrical tolerance and where to use the norm
- Work Planning and documentation
- Measuring tools
- Hand tools

- Bench work
- Portable and bench drilling machines
- Lathe machine
- Grinding machine
- Inspection and quality control
- Preventive maintenance of machine tools
- Metal cutting technology
- Materials and metallurgy
- WIBA act (2007)
- Report writing

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the learner: 1.1 Observed rules and procedures in the workshop 1.2 Interpreted technical drawing 1.3 Produced operation plan 1.4 Produced holes on a workpiece 1.5 Threaded using taps and dies 1.6 Assembled metal parts 1.7 Polished finished work 1.8 Maintained tools and equipment 1.9 Did housekeeping before, during and after operations
2. Resource Implications	1.1 Hand measuring tools 1.2 Hand marking tools 1.3 Hand tools 1.4 Inspection tools and equipment 1.5 Hand drilling machine

	1.6 Bench Drilling machine 1.7 Lathe machine 1.8 Grinding machine 1.9 Work benches
3. Methods of Assessment	Competency may be assessed through: 1.1 Observing the behaviour of the learner 1.2 Oral presentations 1.3 Inspection of written operation procedures 1.4 Inspection of finished product 1.5 Observing housekeeping of the work area and/or machine tool
4. Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

CORE UNITS OF COMPETENCY

PERFORM VEHICLE BASIC MAINTENANCE

UNIT CODE: ENG/OS/AUT/CR/1/6

Unit description

This unit specifies the competencies required to perform vehicle basic maintenance. It involves assessing vehicle mechanical and operational condition, carrying out diagnosis tests, replacing service parts, replenishing fluids and lubrications, conducting tests and complete the procedure.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. **Bold and italicized terms are elaborated in the Range**
1. Assess vehicle mechanical and operational condition	1.1 Assessment is undertaken in accordance with manufacturers' routine and periodic maintenance schedule 1.2 Defects are identified using prescribed assessment methods as per service manual 1.3 Mechanical and operational assessment report is prepared as per organizations approved format
2. Carry out diagnostic tests	2.1 Service technical information is sourced as per service manual

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. **Bold and italicized terms are elaborated in the Range**
	2.2. Condition and performance of the vehicle system is assessed using diagnostic equipment and tools as prescribed by the manufactures' specifications 2.3 Diagnostic assessment report is prepared and provided as per the organization policy
3. Service vehicle lubrication system	3.1 Vehicle lubrication system is diagnosed according to manufacturer' manuals 3.2 Engine transmission and hydraulic filters are replaced according to assessment results 3.3 Vehicle components are greased according to manufacturer's specifications 3.4 Lubrication system pressure is tested according to workshop procedures
4. Replenish fluids and lubricants	4.1 Lubricants for engines and transmissions are obtained using vehicle manufacturers' specifications

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. **Bold and italicized terms are elaborated in the Range**
	4.2 Grades of fluids for brakes and clutch operation, power assisted steering, cooling system, windscreen washers and diesel exhaust emission control are identified and obtained as per manufactures' technical information 4.3 Protective measures on lubricants and fluids are applied as per the workplace policy and OSHA 2007. 4.4 Lubricants and fluids are replenished as prescribed by vehicle manufacturers' specifications. 4.5 Waste oil and fluids are disposed in compliance with workplace policy and OSHA 2007.
5. Replace/service vehicle service parts	5.1Tools and equipment for use are selected, obtained and assembled based on service manual 5.2Vehicle service parts are identified, verified, replaced and adjusted as per manufacturer's part numbers.

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. **Bold and italicized terms are elaborated in the Range**
	5.3Teston the vehicle is carried out to ascertain replaced/serviced parts perform according to the service manual 5.4 Worn out/damage parts are disposed as per the workplace policy and OSHA 2007 5.5Vehicle replacement/servicing records are prepared and kept according to the workplace requirements 5.6Maintenance activities are completed within an agreed time frame as per organization policy
6. Conduct road tests	6.1 Visual inspection of the vehicle and its system is carried out as per manufacturers specifications 6.2 Vehicle is road-tested in compliance with company standards, traffic rules and manufacturers' standards
7. Carry out adjustments to vehicle components and systems.	7.1 Using of manufacturers technical information to identify operating specifications and tolerances 7.2 Identifying components and

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. **Bold and italicized terms are elaborated in the Range**
	systems that are to be checked and adjusted
8. Service Vehicle Wheels and Tyres	8.1 Identify and repair tyre punctures according to vehicles fault 8.2 Perform wheel balancing according to standard operating procedures 8.3 Perform tyre fitting on the rim according to SOP 8.4 Straighten bent wheel rims according to SOP 8.5 Replace tyre pressure nozzles according to SOP 8.6 Maintain tyre pressure according to manufacturer's specifications.
9. Finalize service and repair procedures.	9.1 Vehicle interior and exterior is cleaned and made presentable in compliance with company policy 9.2 Vehicle service and repair report is prepared and shared as per the organizations requirement 9.3 Service and repair records are maintained as per organization policy.

RANGE

This section provides work environments and conditions to which the performance criteria
apply. It allows for different work environments and situations that will affect performance.

Variable	**Range**
1. Technical information may include but is not limited to:	1.1 Vehicle technical data; 1.2 Manufacturers' online information; 1.3 Schedules of inspection; 1.4 Legal regulations 1.5 On-board diagnostics (OBD) displays.
2. Assessment methods may include but is not limited to:	2.1 Aural (noise); 2.2 Visual 2.3 Vibration 2.4 Digital diagnostic equipment 2.5 Functional 2.6 Measurement
3. Periodic maintenance may include but is not limited to:	3.1 brake pads/linings 3.2 fluid leaks 3.3 noise and vibration 3.4 air-conditioning 3.5 gas leaks 3.6 Tyre wear 3.7 fan belt
4. Vehicle systems may include but is not limited to:	4.1 Engine management (fuel, ignition, emission control) 4.2 Battery, charging and starter 4.3 Engine cooling 4.4 Steering and suspension 4.5 Air conditioning;

Variable	Range
	4.6 Lighting
5. Adjustments may include but is not limited to:	5.1 Valve clearances 5.2 Spark plug gaps 5.3 Exhaust emission settings 5.4 Wheel, steering and suspension alignment 5.5 Headlight alignment; 5.6 Drive belt tension; 5.7 Engine idling speed; 5.8 Lubricant and fluid levels; 5.9 Fuel pressure; 5.10 Brake clearances; 5.11 Tyre pressure. 5.12 Wheel balancing 5.13 Fluid level
6. Assessments may include but is not limited to:	6.1 Damage; 6.2 Fluid leaks; 6.3 Air conditioning gas leaks; 6.4 Wear and tear; 6.5 Security of parts and components; 6.6 Condition and serviceability; 6.7 Necessity for adjustment.
7. Vehicle service parts may include but is not limited to:	7.1 Oil, fuel, air and diesel exhaust filters; 7.2 Wiper blades; 7.3 Spark plugs; 7.4 Brake pads/linings; 7.5 Drive belts; 7.6 Seals and gaskets. 7.7 Tyre fitting and puncture repair 7.8 Lining/pad

Variable	Range
	7.9 Fan belts
8. Approved format may include but is not limited to:	8.1 Manufacturers' maintenance schedules; 8.2 Company's maintenance schedules.
9. Agreed time frame may include but is not limited to:	9.1 Manufacturers' recommended work times; 9.2 Job times set by the company; 9.3 Job time agreed with a specific customer.
10. High energy electrical components may include but is not limited to:	10.1 High tension ignition circuit; 10.2 Xenon headlamps.
11 Lubricants and fluids may include but is not limited to:	11.1 Engine oil 11.2 Gear box oil 11.3 Automatic transmission oil (ATF) 11.4 Brake fluids 11.5 Coolants

REQUIRED KNOWLEDGE

The individual needs to demonstrate knowledge of:

- Organizational and legislative requirements
- Manufacturer's warranty requirements relating to routine maintenance activities for vehicle systems and components
- Methods of assessing vehicle conditions
- Report writing
- Technical information
- Customer relation
- Diagnostic tools and equipment
- Rectification system defects

- Vehicle fluids and lubricants
- Vehicle systems and components
- Vehicle inspection
- Legal requirements relating to the vehicle maintenance activities for vehicle systems and components
- Kenyan legislation and workplace procedures relevant to:
    - Health and safety
    - The environment (including waste disposal)
    - Appropriate personal and vehicle protection
- Workplace procedures for:
- Recording vehicle maintenance work and any variations from the
    - Original vehicle specification
    - The referral of problems
- Reporting delays to the completion of work
- documenting vehicle maintenance information
- work timeframe
- Sharing of information at workplace
- Relationship between time and costs
- Reporting anticipated delays to relevant person(s) promptly
- Technical information
    - Finding and sources
    - Importance of correctness in sourcing
    - Use
    - interpreting
- On-board diagnostic displays
- Purpose of and how to use identification codes
- Operation of vehicle systems
- Engines, cooling systems, air supply and exhaust systems, fuel systems and ignition systems operate for different vehicles
- How clutch assemblies, clutch operating systems, manual gear boxes, automatic gear boxes, drivelines and hubs and final drive assemblies operate for different vehicles

- Suspension systems, steering systems, braking systems, wheels and tyres for motor vehicle operate
- The purpose, operating principles and location of vehicle batteries, charging systems, starting systems, lighting systems and ancillary equipment for the different type of vehicle
- The operating specifications and tolerances for the different type(s) of vehicles
- The hazards associated with high energy electrical components
- Routine maintenance requirements
- How to conduct scheduled, routine light vehicle maintenance activities using prescribed examination methods and assessments against vehicle specifications to identify damage, corrosion, inadequate fluid levels, leaks, wear, security problems and general condition and serviceability
- How to check and adjust clearances, gaps, settings, alignment, pressures, tension, speeds and levels relevant to the engine area, transmission area, chassis area, electrical area and body (including to valves, ignition, fuel and emissions, brakes, transmission, lights, headlight alignment, tyres and tyre rotation, steering and body fittings).
- How to replenish and replace routine service components and materials, including filters, drive belts, spark plugs, wiper blades, brake linings and pads, lubricants and fluids
- How to recognise and report cosmetic damage to vehicle components and units that are outside the scope of normal routine service
- How to identify codes and grades of lubricants, brake/clutch fluids and coolants
- How to work safely avoiding damage to the vehicle and its systems
- The consequence of using incorrect lubricants, fluids and components

REQUIRED SKILLS

- Communications (verbal and written);
- Trouble shooting
- Proficient in ICT;
- Time management;
- Problem solving;
- Decision making;
- Multitasking;
- First aid;
- Report
- Driving.
- Planning
- Writing

EVIDENCE GUIDE

This provides advice on assessment and must be in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency.	***Assessment requires evidence that the candidate***: 1.1 Used manufacturers' technical information and prescribed procedures in vehicle maintenance activities 1.2 Established and recorded accurate diagnosis of vehicle systems 1.3 Serviced vehicle components as per the service manual and customer's specification 1.4 Replenished fluids and carried out adjustments and replacement of serviceable part 1.5 Recorded work that was carried out, including the assessment of vehicle condition and its systems

	1.6 Conducted road test and handed the vehicle to the customer in a clean condition 1.7 Prepared maintenance records
2. Resource Implications.	***The following resources must be provided:*** 2.1 A workshop that is fully equipped for maintaining motor vehicles, including a vehicle lift, specialist tools and diagnostic equipment appropriate for the different makes of vehicles that are being maintained; 2.2 Access to manufacturers' technical information; 2.3 Consumables for maintaining vehicle, including lubricants, fluids and replacement parts; 2.4 Facilities for the disposal of waste oil and replaced serviceable parts; 2.5 Customer database and systems for recording maintenance records; 2.6 Personal protection equipment and suitable coverings to protect vehicles.
3. Methods of Assessment.	***Competency may be assessed through:*** 3.1 Observation with the use of checklists; 3.2 Verbal questioning during maintenance activities to test underpinning knowledge; 3.3 Short-answer tests to assess understanding of vehicle systems and the importance of using correct lubricants and fluids.
4. Context of Assessment.	4.1 Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions.
5. Guidance	4.2 This unit may be assessed on an integrated

information for assessment.	basis with others within this occupational sector.

SERVICE AND REPAIR VEHICLE ENGINE COMPONENTS

UNIT CODE: ENG/OS/AUT/CR/2/6

Unit description:
This unit specifies competencies required to service and repair vehicle engine components. It involves troubleshooting and servicing vehicle engine components, performing vehicle engine overhaul, servicing vehicle engine cooling system, servicing vehicle engine exhaust system and lubricating vehicle engine system

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Troubleshoot vehicle ***engine components*** condition	1.1 Personal protective equipment (PPE) are used as per OSHA 2007 1.2 Health and safety regulations are observed as per OSH Act 2007 1.3 Engine is removed according to manufacturer's specification 1.4 Engine parts are dismantled according to manufacturer's specification 1.5 Engine parts are inspected and checked as per workplace procedures 1.6 Engine defective parts are replaced according to manufacturer's

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	specification 1.7 Engine parts are serviced according to manufacturer's specification 1.8 Vehicle engine parts are reassembled according to manufacturer's specification 1.9 Engine is fit back into the vehicle according to manufacturer's specification 1.10 Re-installation checks are performed according to manufacturer's specification
2. Perform vehicle engine overhaul	2.1 Engine oil seals are replaced according to manufacturer's specification 2.2 Engine oil rings/ piston gudgeon pin are replaced according to manufacturer's specification 2.3 Timing belts/chains are replaced according to manufacturer's specification 2.4 Engine bearings are replaced according to manufacturer's specification 2.5 Engine pulleys are replaced according to manufacturer's specification

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	2.6 Engine V-belts are replaced according to manufacturer's specification 2.7 Engine gaskets are replaced according to manufacturer's specification 2.8 Engine blocks are serviced according to manufacturer's specification 2.9 Water/oil pump is replaced according to manufacturer's specification 2.10 Tappet clearance is adjusted according to manufacturer's specification 2.11 Engine camshaft is replaced according to manufacturer's specification 2.12 Valve seats are grinded according to manufacturer's specification 2.13 Valve guides are replaced according to manufacturer's specification 2.14 Oil sump/strainer/PCV is replaced according to manufacturer's specification 2.15 Engine mountings are replaced according to manufacturer's specification 2.16 Engine tune up is performed according to manufacturer's specification

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
3. Service vehicle engine cooling system	3.1 3.1 Radiator cap is checked and tested according to manufacturer's specification 3.2 Cooling radiator is checked and tested according to manufacturer's specification 3.3 Cooling system hoses are checked and tested according to manufacturer's specification 3.4 Thermostat operations are checked and tested according to manufacturer's specification 3.5 Thermistor switches/ sensors are checked and tested according to manufacturer's specification 3.6 Water pump is checked and tested according to manufacturer's specification 3.7 Cooling fan operation is checked and tested according to manufacturer's specification 3.8 Cooling system is pressure tested according to manufacturer's specification 3.9 Cooling system is bled according to

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	manufacturer's specification 3.10 Vehicle engine coolant is "read" according to manufacturer's specification 3.11 Coolant is replenished/ drained and replaced according to manufacturer's specification
4. Service vehicle engine exhaust system	4.1 Leakage is checked according to workplace procedures 4.2 Blockage is checked according to workplace procedures 4.3 Catalytic converter/ particulate filters is checked and tested according to workplace procedures 4.4 Exhaust system leaks are repaired according to manufacturer's specification 4.5 Exhaust system is installed and mounted according to manufacturer's specification 4.6 Oxygen sensor is checked and tested according to manufacturer's specification
	4.7 Draining and replacing engine oil

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	4.8 Replacing engine transmission and hydraulic filters 4.9 Greasing light vehicle components 4.10 Greasing heavy commercial vehicle components 4.11 Greasing Heavy machinery 4.12 Reading Lubricants
5. lubricate vehicle engine system	5.1 engine oil is drained and replaced according to manufacturer's specification 5.2 engine transmission and hydraulic filters are replaced according to manufacturer's specification 5.3 light vehicle components are greased according to manufacturer's specification 5.4 heavy commercial vehicle components are greased according to manufacturer's specification 5.5 Heavy machinery are greased according to manufacturer's specification 5.6 Lubricants are "read" according to manufacturer's specification

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	**Range**
1. Re-installation checks may include but is not limited to:	1.1 bleeding 1.2 engine ignition timing 1.3 initialization
2.Engine components may include but is not limited to:	2.1 Oil seals and oil filters 2.2 Piston and piston rings 2.3 Top covers 2.4 Valves, push rods and valve lifters 2.5 Camshaft 2.6 Crankshaft 2.7 Drive pulleys 2.8 Oil sump and oil pump 2.9 Timing gears 2.10 Cylinder head 2.11 Cylinder block
3.Engine pulleys may include but is not limited to:	3.1 water pump 3.2 camshaft
4. Engine V-belts may include but is not limited to:	4.1 fan 4.2 power steering

REQUIRED KNOWLEDGE AND SKILLS

The individual needs to demonstrate knowledge of:

- Legislative and organizational requirements and procedures
- Kenyan legislation and workplace procedures relevant to:
    - Health and safety
    - Environment
    - Personal and vehicle protective equipment
    - Waste disposal
- Legal requirements relating to the vehicles warranty and insurance policies
- Workplace procedures for:
    - Recording the fault, the location and fault correction activities
    - Reporting the results of tests
    - The referral of problems
    - Reporting anticipated delays
- Assessment and rectification procedures
- Obtaining the correct information for rectification
- Documenting assessment and rectification information
- Working to agreed time frame and keeping others informed of progress
- The relationship between time, costs and profitability
- Reporting anticipated delays
- How to find, interpret and use technical information for engine service activities
- Importance of using the correct technical information
- The purpose of and how to use identification codes.

Required Skills

The individual needs to demonstrate the following skills:

- Communications (verbal and written)
- Proficient in ICT
- Time management
- Problem solving
- Decision making
- Planning
- Multitasking
- First aid
- Report writing
- Driving

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of competency.	***sessment requires evidence that the candidate***: 1.1 Used Personal protective equipment (PPE) 1.2 Observed Health and safety regulations 1.3 Removed engine 1.4 Dismantled engine parts and inspected them 1.5 Replaced defective engine parts 1.6 Serviced engine parts 1.7 Reassembled vehicle engine parts 1.8 Fit back engine into the vehicle 1.9 Performed vehicle engine overhaul 1.10 Serviced vehicle engine cooling system 1.11 Serviced vehicle engine exhaust system 1.12 Lubricated vehicle engine system

2. Resource implications.	***The following resources must be provided:*** 2.1 A workshop that is fully equipped for the service and repair of vehicle engines 2.2 Instruments and equipment for measuring and assessing the condition of engine components 2.4 Access to manufacturers' technical information 2.5 Facilities for the disposal of waste oil and scrap parts 2.6 Customer database and systems for recording service records 2.7 Personal protection equipment 2.8 Access to computers
3. Methods of assessment.	***Competency may be assessed through:*** 3.1 Observation with the use of checklists 3.2 Verbal questioning during service and repair activities to test underpinning knowledge 3.3 Short-answer tests to assess understanding of engine operations, measuring, assessing component condition and fault rectification.
4. Context of Assessment.	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions.
5. Guidance information for assessment.	This unit may be assessed on an integrated basis with others within this occupational sector.

SERVICE VEHICLE FUEL SYSTEM

UNIT CODE: ENG/OS/AUT/CR/3/6

Unit description:
This unit specifies competencies required to service vehicle fuel system. It involves, servicing fuel components, replacing petrol fuel and diesel injector pumps, pipes, rail and nozzles, performing injector pump timing and testing fuel injector and injection pressure and voltage.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Service fuel components e.g. injectors, tank	1.1 Identify the component to be serviced according to vehicle's performance. 1.2 Tools and equipment are used according to manufacturer's manual. 1.3 Remove faulty component according to manufacturer's manual. 1.4 Service the faulty component according to manufacturer's manual.
2. Replace petrol fuel pump	2.1 Petrol fuel pump location is identified as per manufacturers

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	manual 2.2 Petrol fuel pump is removed and replaced as per manufacturers manual 2.3 Tools and Equipment are used to remove and refit petrol fuel components as per manufacturers' manual 2.4 Faulty fuel pump is stored as per company policy 2.5 Fuel system operation test is conducted as per manufacturers manual
3. Replace diesel injector pump, rail, pipes and nozzles	3.1 Diesel injector pump, rail, pipes and nozzles location is identified as per manufacturers manual. 3.2 Pump, rail, pipes and nozzles are removed as per ***manufacturer's procedure.*** 3.3 New pump, rail, pipes and nozzles are fitted as per manufacturers manual. 3.4 Air bubbles from the fuel system are removed by bleeding the system in accordance with the manufacturer's specification.

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	3.5 Diesel system operation test is conducted as per manufacturer's manual
4. Perform injector pump timing	4.1 Fan belt and timing cover are removed in accordance with the workshop manual 4.2 Timing marks are identified in accordance with manufacturers' manual 4.3 Timing marks are aligned and timing belt fitted as per manufacturers manual 4.4 Timing belt tensioner is adjusted and timing marks reconfirmed as per manufacturers manual 4.5 Timing cover and fan belt are fitted back as per manufacturers manual 4.6 Diesel system operation test is performed as per manufacturers manual
5. Test fuel injectors for injection pressure and voltage	4.7 Identify the gauges for testing according manufacturer's specification. 4.8 Tools and equipment are identified according to

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	manufacturer's manual. 4.9 Connect the gauges according to manufacturer's manual 4.10 Take the measurements according to manufacturer's specification. 4.11 Record and file results according to standard operating procedures (SOP)

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Tools and equipment may include but is not limited to:	1.1 Specialist tools relevant to specific vehicle makes and models; 1.2 General workshop equipment; 1.3 Electrical multi-meter 1.4 Fuel system pressure gauge 1.5 Faulty code diagoniser 1.6 Prepared and shared vehicle fuel system service report
2. Components may include but is not limited to:	2.1 Fuel pump 2.2 Fuel filter 2.3 Fuel tank

Variable	Range
	2.4 Fuel high pressure pump 2.5 Fuel pipes 2.6 Fuel feed pump 2.7 Injectors 2.8 Fuel level gauge 2.9 Fuel sensors
3. Manufacturer's procedure may include but is not limited to:	3.1 Vehicle technical data 3.2 Manufacturers' tolerances and specification data. 3.3 Manufacturers' specifications 3.4 Approved company practices
4. Gauges may include but is not limited to:	4.1 Pressure gauge 42 Multimeter gauge
5. Measurements may include but is not limited to:	5.1 Injection pressure 5.2 Injection voltage
6. standard operating procedures (SOP) may include but is not limited to:	6.1 Company policy 6.2 Filling system 6.3 Record management procedures 6.4 Client satisfaction procedures.

REQUIRED KNOWLEDGE AND SKILLS

The individual needs to demonstrate knowledge of:

- Handling fuel in line with health and safety precautions
- Interpretation of symbols on the manufacturers manual
- Fuel system
- Legislative and organisational requirements and procedures
- Kenyan legislation and workplace procedures relevant to:
- health and safety;
- the environment (including waste disposal
- Appropriate personal and vehicle protective equipment.

- Legal requirements relating to the vehicle, its construction and fuel and exhaust emission control. Workplace procedures for:
    - Recording fault location and correction activities;
    - Reporting the results of tests;
    - The referral of problems;
    - Reporting delays to the completion of work.

The importance of working to recognized assessment and rectification

- Procedures and obtaining the correct information for rectification.
- The importance of documenting assessment and rectification information.
- The importance of working to agreed timescales and keeping others informed of progress
- The importance of reporting anticipated delays to relevant person(s) promptly.

Required Skills

The individual needs to demonstrate the following skills:

- Communications (verbal and written)
- Proficient in ICT
- Time management
- Interpretation
- Problem solving
- Planning;
- Decision making;
- Multitasking;
- First aid;
- Report writing;
- Driving

EVIDENCE GUIDE

This provides advice on assessment and is dealt in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency.	Assessment requires evidence that the candidate: 1.1 Worked in a safe and clean environment using personal protection and appropriate tools and equipment; 1.2 Observed regulations concerned with health and safety and the disposal of waste; 1.3 Used technical information to service vehicle fuel system in accordance with manufacturers' specifications; 1.4 Inspected and replaced fuel system components; 1.5 Tested fuel system for satisfactory operation as per the manufacturers specifications.
2. Resource implications.	***The following resources must be provided:*** 2.1 Workshop that is fully equipped for the service of vehicle fuel system 2.2 Specialist tools relevant to specific vehicle makes and models; 2.4 Electrical Multimeter 2.7 Access to manufacturers' technical information; 2.8 Facilities for the disposal of waste fuel and scrap parts; 2.9 Customer database and systems for service records; 2.11 Personal protection equipment.
3. Methods of assessment.	Competency may be assessed through: 3.1 Observation with the use of checklists

	3.2 Verbal questioning during practical activities 3.3 Short-answer tests
4. Context of assessment.	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions.
5. Guidance information for assessment.	This unit may be assessed on an integrated basis with others within this occupational sector.

SERVICE VEHICLE TRANSMISSION SYSTEMS

UNIT CODE: ENG/OS/AUT/CR/4/6

UNIT DESCRIPTION:

This unit specifies competencies required to service vehicle transmission system. It involves preparing to service vehicle transmission systems, removing, assessing, repairing/replacing and testing the vehicle transmission system.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Organize to service vehicle transmission system	1.1 Work area is cleaned and safety measures undertaken before use as per workshop regulations/ OSHA 1.2 Vehicle is parked on a workshop hoist as per workshop regulations 1.3 Tools and equipment and materials are availed as per manufacturers recommendation 1.4 Identify relevant workforce according to workshop procedures.
2. Troubleshoot vehicle transmission system	2.1 Visual inspection of the vehicle is done according to workshop procedures. 2.2 Technical inspection is done while engine is running according to manufacturer's specifications. 2.3 Vehicle is inspected underneath

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	according to workshop setup. 2.4 Faulty components are established according to inspection done.
3. Overhaul gear box unit (Manual)	3.1 Drain gearbox oil according to workshop procedures. 3.2 Remove faulty gearbox from vehicle according to manufacturer's manual. 3.3 Clean external housing of the gearbox according to workshop procedures. 3.4 Dismantle faulty gearbox according to manufacturer's manual. 3.5 Clean internal ***manual gearbox components*** according to workshop procedures. 3.6 Service and replace worn out gearbox components according to manufacturer's specifications. 3.7 Assemble serviced/new components of the gearbox according to manufacturer's manual. 3.8 Fit new gearbox mounting according to workshop procedures. 3.9 Refit serviced gearbox to the vehicle according to manufacturer's manual. 3.10 Refill gearbox oil to the Recommended level according to

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	manufacturer's specification. 3.11 Test serviced gearbox according to workshop procedures.
4. Overhaul gearbox (semi/automatic)	4.1 Drain automatic transmission fluid (ATF) according to workshop procedures. 4.2 Remove faulty gearbox from the vehicle according to manufacturer's manual. 4.3 Clean external housing of the gearbox according to workshop procedures. 4.4 Dismantle faulty gearbox according to manufacturer's manual. 4.5 Clean internal ***semi/automatic gearbox components*** according to workshop procedures. 4.6 Service and replace worn out gearbox components according to manufacturer's specifications. 4.7 Assemble serviced/new components of the gearbox according to manufacturer's manual. 4.8 Fit new gearbox mountings according to workshop procedures. 4.9 Refit serviced gearbox to the vehicle according to manufacturer's manual. 4.10 Refill ATF to the recommended level according to manufacturer's

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	specification. 4.11 Test serviced gearbox according to workshop procedures.
5. Carry out hydraulic/tiptronic system tests and measurements	5.1 Identify tools and equipment according to manufacturer's specifications. 5.2 Perform stall test according to manufacturer's manual 5.3 Perform pressure test according to manufacturer's specifications. 5.4 Perform shift test according to manufacturer's specifications. 5.5 Perform tiptronic diagnosis test using fault diagnostic gadget according to manufacturer's manual. 5.6 Record and file results according to standards operation procedures.

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Components may include but is not limited to:	1.1 Bearings 1.2 Gears

Variable	Range
	1.3 Synchromesh unit 1.4 Gearbox shafts and thrust plates 1.5 Gear selectors, sensors and linkages 1.6 Constant velocity and universal joints 1.7 Clutch assemblies release bearings 1.8 Automatic gearbox pump and oil strainer 1.9 Transmission unit mounting 2.0 Flywheel 2.1 Transmission drive shaft/half shaft 2.2 Propeller shaft/center rubber
2. Manual gearbox components may include but is not limited to:	2.1 Input shaft 2.2 Lay shaft 2.3 Output shaft 2.4 Speed gearwheels 2.5 Synchronizer unit 2.6 Selector shafts/forks
3. Semi/automatic gearbox components may include but is not limited to:	3.1 Fluid flywheel 3.2 Torque convertor 3.3 Shift valve 3.4 Brake bands 3.5 Front clutch 3.6 Rear clutch 3.7 Sun wheel gears 3.8 Planetary gears 3.9 Carrier gear 4.0 Output shaft

REQUIRED KNOWLEDGE AND SKILL

Required knowledge

The individual needs to demonstrate knowledge of:

- Operation of transmission systems
- Measuring, assessing the condition of components
- Fault rectification
- Kenyan legislation and workplace procedures relevant to:
    - health and safety
    - the environment (including waste disposal
    - personal and vehicle protective equipment
- Legal requirements relating to the vehicle and its construction
- Workplace procedures for:
    - recording fault location and correction activities;
    - reporting the results of tests;
    - the referral of problems;
    - reporting delays to the completion of work
- Recognized assessment and rectification
- Procedures and obtaining the correct information for rectification
- Documenting assessment and rectification information
- Working within given time frame and sharing information
- The relationship between time, costs and profitability
- How to find, interpret and use sources of technical information for transmission of servicing activities
- Reporting anticipated delays to relevant person(s)
- Purpose of, and how to use identification codes
- How to prepare, inspect, test and use all the removal and replacement equipment required
- Operation of transmission systems
- Gaskets, sealants, seals, fittings and fasteners
- Test and evaluate the performance of replacement transmission system units and components

- The relationship between testing methods and the transmission system units and components replaced – the use of appropriate test methods
- When replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
- How to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances
- How to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances

Required Skills

The individual needs to demonstrate the following skills:

- Decision making;
- Multitasking;
- First aid;
- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Problem solving;
- Planning;
- Report writing;
    - Driving

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency.	***Assessment requires evidence that the candidate***: 1.1 Worked in a safe and clean environment using personal protection and appropriate tools and equipment; 1.2 Observed regulations concerned with health

	and safety and the disposal of waste; 1.3 Used technical information to remove and dismantle transmission units and assess components against manufacturers' specifications 1.4 Prepared recommendations for the repair and restoration of components 1.5 Restored, reassembled and replaced transmission units to accord with manufacturers' specifications 1.6 Prepared vehicle transmission system servicing report. 1.7 Completed vehicle transmission system servicing within agreed time frame. `
2. Resource Implications.	***The following resources must be provided:*** 2.1 Workshop fully equipped for servicing motor vehicle transmission systems 2.2 Vehicle lift, 2.3 Specialist tools and equipment appropriate for the different makes of vehicles 2.4 Instruments and equipment for measuring and assessing the condition of transmission units; 2.5 Specialist equipment for servicing automatic transmission units; 2.6 Access to manufacturers' technical information; 2.7 Facilities for the disposal of waste oil and scrap parts; 2.8 Customer database and systems for recording service records; 2.9 Personal protection equipment.

3. Methods of Assessment.	***Competency may be assessed through:*** 3.1 Observation with the use of checklists; 3.2 Verbal questioning during service and repair activities 3.3 Short-answer tests
4. Context of Assessment.	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions.
5. Guidance information for assessment.	This unit may be assessed on an integrated basis with others within this occupational sector.

SERVICE VEHICLE STEERING SYSTEM

UNIT CODE: ENG/OS/AUT/CR/5/6

UNIT DESCRIPTION:

This unit specifies competencies required to service vehicle steering system. It involves assessment, removal, servicing and replacement of vehicle steering components. It also involves fitting and testing vehicle steering components and documenting vehicle steering service.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. Bold and italicized terms are elaborated in the Range
1. Assess vehicle steering system	1.1 Work area and steering units are prepared as per the workshop procedures 1.2 ***Tools and equipment*** are assembled as per job assignment 1.3 Vehicle steering system checklist is prepared based on workplace requirements 1.4 Personal protective clothing and equipment (***PPE***) is used as per ***OSHA 2007*** 1.5 Steering systems are visually inspected in accordance with service manual 1.6 Faulty steering components are identified as per the service manual
2. Remove steering components	2.1 ***Technical information*** is used according to the service manual

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. Bold and italicized terms are elaborated in the Range
	2.2 Vehicle is raised in accordance with workshop procedures 2.2 ***Lubricants and fluids*** are drained and disposed according to health and safety standards 2. Steering components are removed as per service manual
3. Assess serviceability of vehicle steering components	3.1 ***Steering components*** are disassembled as per the service manual 3.2 Steering components are cleaned in accordance with service manual 3.3 Serviceability of steering components is ***assessed*** as per the service manual 3.4Serviceability report is prepared in accordance with workshop procedure
4. Replace/service vehicle steering components	4.1 Worn/damaged components are replaced as per manufacturer's manual 4.2 Replacement parts are verified against manufacturers' part numbers 4.3 Steering components are re-assembled in accordance with manufacturers' specification 4.4 Vehicle steering components are serviced according to the service manual
5. Fit and test vehicle steering components	5.1 Steering components are fitted back as per service manual 5.2 Lubricants and fluids are replenished

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. Bold and italicized terms are elaborated in the Range
	according to the service manual 5.3***Steering geometry*** is set in accordance with manufacturers' specifications 5.4 Steering system is tested as per the manufacturers specification 5.5 ~~R~~oad test is carried out in accordance with manufacturers' specifications
6. Document vehicle steering system service	6.1. Steering service and repair is completed according to workplace policy/customer's specification 6.2 Vehicle steering service system report is prepared as the SOPs 6.3 Steering ***service and repair records*** are generated and shared in line with company standard operating procedures

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Steering components may include but is not limited to:	1.1 Steering rack 1.2 Tie rods; 1.3Steering box 1.4Steering column 1.5 Universal joint/coupling 1.6 Drop arm 1.7 Dust rubber boot 1.8 Steering wheel
3. Assessment methods.	3.1 Visual 3.2 Measurement 3.3 Acoustic 3.4 Vibration 3.5 Functional 3.6 Serviceable 3.7 Unserviceable 3.8 Tolerances
5. Steering geometry / wheel alignment	5.1 Toe in / Toe out 5.2 Castor 5.3 Camber 5.4 Kingpin inclination
6. Service and repair records	6. Job cards 6.2 Company IT system 6.3 Customer database
7. Agreed timeframe	7.1 Manufacturers' recommended work times 7.2 Job times set by the company 7.3 Job time agreed with a specific customer

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge of:

- Kenyan legislation and workplace procedures relevant to:
  - health and safety
  - the environment (including waste disposal
  - personal and vehicle protective equipment
- Legal requirements relating to the vehicle and its construction
- Workplace procedures for:
  - recording fault location and correction activities;
  - reporting the results of tests;
  - the referral of problems;
- reporting delays to the completion of work
- sources of technical information
- How to use wheel alignment and steering geometry measuring and adjusting equipment
- Construction and operation of suspension and steering systems
- The construction, layout and operation of different types of suspension systems, including:
  - Beam axle;
  - Independent types; front and rear;
  - Hydro-Pneumatic;
  - Active suspension and their control systems.
  - Types of springs and how they are mounted and located on the vehicle
  - The layout and operation of different types of steering systems, including
- Different types of steering gear, including:
  - Rack and pinion;
  - Recirculating ball.
  - Hydraulic and electronic power assisted
- The principles of suspension and steering geometry including:

    - Front and rear wheel alignment;
    - Toe-out-on-turns;
    - Camber;
    - Castor;
    - Kingpin inclination.
- How to remove and replace suspension and steering system units and components for the classification of vehicle being worked on
- How to select and use gaskets, sealants, seals, fittings and fasteners
- How to test and evaluate the performance of replacement suspension and steering system units and components against vehicle operating specifications, and any legal requirements
- When replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
- How to work safely avoiding damage to other vehicle systems, units and components

Required Skills

The individual needs to demonstrate the following foundation skills:

- Decision making;
- Multitasking;
- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Problem solving;
- Planning
- First aid;
- Report writing;
- Record keeping
- Driving

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency.	***Assessment requires evidence that the candidate***: 1.1 Worked in a safe and clean environment using personal protection and appropriate tools and equipment; 1.2 Observed regulations concerned with health and safety and the disposal of waste 1.3 Used technical information to remove and dismantle steering units 1.4 Assessed vehicle steering components against manufacturers' specifications 1.4 Repaired/serviced, replaced and restored components as per manufacturer's specification 1.5 Reassembled steering components in accordance with manufacturers' specifications 1.6 Completed steering system servicing within set time frame 1.6 Documented steering servicing records as per customer specifications and company policy.
2. Resource implications.	***The following resources must be provided:*** 2.1 A workshop that is fully equipped for servicing vehicle steering systems. 2.2 Vehicle lift 2.3 Tool kits and vehicle steering equipment 2.4 Access to manufacturers' technical information 2.5 Facilities for the disposal of waste oil and scrap parts 2.6 Customer database 2.7 Personal protection equipment

	2.8 Computer
3. Methods of Assessment.	***Competency may be assessed through:*** 3.1 Observation 3.2 Verbal 3.3 Written
4. Context of Assessment.	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions.
5. Guidance information for assessment.	This unit may be assessed on an integrated basis with others within this occupational sector.

SERVICE VEHICLE SUSPENSION SYSTEMS.

UNIT CODE: ENG/OS/AUT/CR/6/6

Unit description:

This unit specifies competencies required to service vehicle suspension system. It involves assessment, removal, servicing and replacement of vehicle suspension components. It also involves fitting and testing vehicle suspension components and documenting vehicle suspension service.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. Bold and italicized terms are elaborated in the Range
1. Assess vehicle suspension system	1.1 Work area and steering units are prepared as per the workshop procedures 1.2 ***Tools and equipment*** are assembled as per job assignment 1.3 Vehicle suspension checklist is prepared according to the workplace requirements 1.4 Personal protective clothing and equipment (***PPE***) is used as per ***OSHA 2007*** 1.5 Suspension systems are visually inspected in accordance with service manual 1.6 Faulty suspension components are identified as per the service manual
2.Remove vehicle suspension components	2.1 ***Technical information*** is used according to the service manual 2.2 Vehicle is raised in accordance with

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. Bold and italicized terms are elaborated in the Range
	workshop procedures 2. Suspension components are removed as per service manual
3. Assess vehicle suspension components serviceability	3.1 ***Suspension components*** are disassembled as per the service manual 3.2 Suspension components are cleaned in accordance with service manual 3.3 Serviceability of suspension components is ***assessed*** as per the service manual 3.4 Suspension component serviceability report is prepared in accordance with workshop procedure
4. Replace/service vehicle suspension components	4.1 Worn/damaged components are replaced as per manufacturer's manual 4.2 Suspension components' replacement parts are verified against manufacturers' part numbers 4.3 Suspension components are re-assembled in accordance with manufacturers' specification 4.4 ***Hydrolastic suspension components*** are replaced according to service manual 4.5 ***Hydro-pneumatic components*** are replaced according to service manual 4.6 ***Macpherson strut suspension components*** are serviced/replace as per the service manual
5. Fit and test vehicle	5.1 Suspension components are fitted back as per

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. Bold and italicized terms are elaborated in the Range
suspension components	service manual 5.2 ***Suspension alignment***s set in accordance with manufacturers' specifications 5.3~~R~~oad test is carried out as per the service manual 5.4 Vehicle suspension service checklist is filled in accordance with workplace policy
6. Vehicle suspension system service documentation	6.1. Suspension service and repair is completed within workplace policy/customer's specification 6.2 Vehicle suspension service system report is prepared as the SOPs 6.3 Suspension ***service and repair records*** are generated and shared in line with company standard operating procedures

RANGE

This section provides work environments and conditions to which the performance criteria
apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Suspension components may include but is not	1.1 Wishbone/arms 1.2Shock absorbers/dampers 1.3Strut

Variable	Range
limited to:	1.4Torsion bar 1.5Stabilizer 1.6 Coil/leaf/rubber spring
3. Assessment methods may include but is not limited to:	3.1 Visual 3.2 Measurement 3.3 Acoustic 3.4 Vibration 3.5 Functional 3.6 Serviceable 3.7 Unserviceable 3.8 Tolerances
5. Suspension alignments may include but is not limited to:	5.1 Wheel base 5.2 Wheel track
6. Service and repair records may include but is not limited to:	6. Job cards 6.2 Company IT system 6.3 Customer database
7. Agreed timeframe may include but is not limited to:	7.1 Manufacturers' recommended work times 7.2 Job times set by the company 7.3 Job time agreed with a specific customer

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge of:

- Kenyan legislation and workplace procedures relevant to:
  - health and safety
  - the environment (including waste disposal
  - personal and vehicle protective equipment
- Legal requirements relating to the vehicle and its construction

- Workplace procedures for:
    - recording fault location and correction activities;
    - reporting the results of tests;
    - the referral of problems;
- reporting delays to the completion of work
- sources of technical information
- How to use wheel alignment and steering geometry measuring and adjusting equipment
- Construction and operation of suspension and steering systems
- The construction, layout and operation of different types of suspension systems, including:
- Beam axle;
- Independent types; front and rear;
- Hydro-Pneumatic;
- Active suspension and their control systems.
    - Types of springs and how they are mounted and located on the vehicle
    - The layout and operation of different types of steering systems, including
    - Different types of steering gear, including:
    - Rack and pinion;
    - Recirculating ball.
    - Hydraulic and electronic power assisted
- The principles of suspension and steering geometry including:
    - Front and rear wheel alignment;
    - Toe-out-on-turns;
    - Camber;
    - Castor;
    - Kingpin inclination.
- How to remove and replace suspension and steering system units and components for the classification of vehicle being worked on
- How to select and use gaskets, sealants, seals, fittings and fasteners

- How to test and evaluate the performance of replacement suspension and steering system units and components against vehicle operating specifications, and any legal requirements
- When replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
- How to work safely avoiding damage to other vehicle systems, units and components

REQUIRED SKILLS

The individual needs to demonstrate the following foundation skills:

- Decision making;
- Multitasking;
- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Problem solving;
- Planning
- First aid;
- Report writing;
- Record keeping
- Driving

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency.	***Assessment requires evidence that the candidate***: 1.1 Worked in a safe and clean environment using personal protection and appropriate tools and equipment 1.2 Observed regulations concerned with health and safety and the disposal of waste

	1.3 Used technical information to remove and disassemble suspension units 1.4 Assessed vehicle suspension components against manufacturers' specifications 1.4 Repaired/serviced, replaced and restored suspension components as per manufacturer's specification 1.5 Reassembled suspension components in accordance with manufacturers' specifications 1.6 Completed suspension system servicing within set time frame 1.6 Documented suspension servicing records as per customer specifications and company policy.
2. Resource Implications.	***The following resources must be provided:*** 2.1 A workshop that is fully equipped for servicing vehicle suspension systems. 2.2 Vehicle lift 2.3 Tool kits and vehicle suspension equipment 2.4 Access to manufacturers' technical information 2.5 Facilities for the disposal of waste oil and scrap parts 2.6 Customer database 2.7 Personal protection equipment 2.8 Computer
3. Methods of assessment.	***Competency may be assessed through:*** 3.1 Observation 3.2 Verbal 3.3 Written
4. Context of	Competency may be assessed

assessment.	individually in an actual workplace or in work-simulated conditions within accredited institutions.
5. Guidance information for assessment.	This unit may be assessed on an integrated basis with others within this occupational sector.

SERVICE VEHICLE BRAKING SYSTEM

UNIT CODE: ENG/OS/AUT/CR/7/6

UNIT DESCRIPTION:

This unit specifies competencies required to service motor vehicle braking system. It involves, assessing, servicing, replacing or repairing and maintaining vehicle braking units and components. It includes final testing to ensure satisfactory operation to the customer's specification.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Assess vehicle braking system	1.1***Tools and equipment*** are used as per service manual 1.2 Personal protective clothing and equipment PPE is used as per workshop regulations 1.3 Vehicle braking system is tested in accordance with **service manual** 1.4**Braking system** are observed according to the service manual 1.5 Braking system observation checklist is filled as per company policy
2. Dismantle wheel **brake assembly parts**	2.1**Vehicle is parked and prepared** in accordance with workshop procedures 2.2 S***ources of technical information*** are used as per service manual 2.3 ***Brake components are*** dismantled as per service

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	manual and checklist 2.3 Lubricants and fluids are drained and disposed in accordance with Occupational Safety and Health regulations ***OSHA 2007***
3.Assess braking components	3.2 ***Brake*** components are cleaned in accordance with the service manual 3.3 Brake c***omponents*** are ***assessed in accordance*** with manufacture's specifications 3.4 Worn/damaged ***components*** are identified according to the service manual 3.5 Compatibility of replacement parts is verified against manufacturers part numbers
4. Replace wheel brake assembly parts	4.1 Brake pads and linings are replaced in accordance to manufacturer's specifications 4.2 Brake calipers and drum are replaced according manufacturer's specifications 4.3 Brake flexible pipes are replaced as per the manufacturer's specifications 4.4 Brake adjusters/actuators (HCV) are replaced as per the manufacturer's specifications 4.5 Parking brake cables are serviced/replaced according to the manufacturer's manual
5. Replace brake cylinders	5.1 Brake master cylinder is replaced/serviced according manufacturer's manual 5.2 Brake slave cylinder is replaced/serviced as per the manufacturer's specifications

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	5.3 Brake booster is serviced as per the
6. Service brake system	6.1 Drum/disc brakes are assembled according to the manuals 6.2 Brake fluid is replenished and system bleeding is carried out as per service manual 6.3 Brake booster and ABS system is service according to the manufacturer's specifications 6.4 Braking system is adjusted (Dynamometer test) as per the workshop manual 6.5 Auxiliary brakes are serviced according the manufacturer's manual 6.6 Vehicle is road tested in accordance with legal requirements and manufacturers parameters 6.7 Service and repair activities are completed within an ***agreed time frame*** 6.8 Service and repair ***records*** are completed in accordance with Standard Operating Procedures

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	**Range**
1. Brake units and components may include but is not limited to:	1.1 Servo unit (booster) 1.2 Master cylinder 1.3 Calipers 1.4 Disc (rotor) 1.5 Drum 1.6 Brake pads and linings 1.7 Wheel cylinders 1.8 Brake adjusters 1.9 Actuators 1.10 ABS unit 1.11 Flexible pipes 1.12 Parking brake cable.
2. Assessment may include but is not limited to:	2.1 Corrosion 2.2 Seizure 2.3 Serviceable 2.4 Unserviceable 2.5 Within or outside tolerances 2.6 Necessitates adjustment.
3. Records may include but is not limited to:	3.1 Job cards 3.2 Company IT system 3.3 Customer database
4. Agreed timescale may include but is not limited to:	4.1 Manufacturers' recommended work times 4.2 Job times set by the company 4.3 Job time agreed with a specific customer
5. High energy electrical	5.1 High tension ignition circuits;

Variable	Range
components may include but is not limited to:	5.2 Xenon Headlamps.

REQUIRED KNOWLEDGE

The individual needs to demonstrate knowledge of:

- Legislative and organizational requirements and procedures
- Kenyan legislation and workplace procedures relevant to:
  - health and safety
  - the environment (including waste disposal);
  - appropriate personal and vehicle protective equipment
- Legal requirements relating to the vehicle and its construction including brake operation and efficiencies
- Workplace procedures for:
  - recording fault location and correction activities;
  - reporting the results of tests;
  - the referral of problems;
  - reporting delays to the completion of work

The importance of working to recognized assessment and rectification procedures and obtaining the correct information for rectification

- The importance of documenting assessment and rectification information.
- The importance of working to agreed timescales and keeping others informed of progress.
- The relationship between time, costs and profitability
- The importance of reporting anticipated delays to relevant person(s) promptly. The use of technical information including
- How to find, interpret and use sources of technical information for brake servicing activities
- The importance of using the correct sources of technical information
- The purpose of, and how to use identification codes

- Vehicle earthing principles and earthing methods
- Electrical and electronic principles associated with transmission systems, including types of sensors and actuators, their application and operation
- Types of circuit protection and why these are necessary.
- Electrical safety procedures, electric symbols, units and terms
- Electrical and electronic control system principles
- The hazards associated with high energy electrical component.

Operation of brake systems

- How brake and their related units and components are constructed, removed and replaced for the classification of vehicle worked upon
- Brake units and components removal and replacement
- How to remove and replace brake system mechanical, electrical and hydraulic units and components for the classification of vehicle worked upon
- How to select and use sealants, seals, fittings and fasteners
- How to test and evaluate the performance of replacement brake system units and components and the reassembled system against the vehicle
- Operating specifications and any legal requirements
- The use of appropriate test methods
- When replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
- How to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances

Required Skills

The individual needs to demonstrate the following skills

- Proficient in ICT
- Time management
- Problem solving

- Communications (verbal and written)
- Planning
- Decision making
- Multitasking
- First aid
- Report writing
- Record keeping
- Driving

EVIDENCE GUIDE

This provides advice on assessment and must be in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency.	***Assessment requires evidence that the candidate***: 1.1 Worked in a safe and clean environment using personal protection and appropriate tools and equipment 1.2 Observed regulations concerned with health and safety and the disposal of waste 1.3 Used technical information to remove and dismantle brake components and assess components against manufacturers' specifications; 1.4 Prepared recommendations for the repair brake components 1.5 Repaired, reassembled and replaced brake components in accordance with manufacturers' specifications 1.6 Finalized servicing activities to conform to vehicle operating specifications within specified time

	frame 1.6 Performed vehicle road test appropriately
2. Resource Implications.	***The following resources must be provided:*** 2.1 A workshop that is fully equipped for servicing light motor vehicle brake systems including a vehicle lift, specialist tools and equipment appropriate for the different makes of vehicles that are being serviced 2.2 Instruments and equipment for measuring and assessing the condition of brake units 2.3 Specialist equipment for servicing ABS brake units 2.4 Access to manufacturers' technical information 2.5 Facilities for the disposal of waste oil, fluids and scrap parts 2.6 Customer database and systems for recording service records 2.7 Personal protection equipment.
3. Methods of Assessment.	***Competency may be assessed through:*** 3.1 Observation with the use of checklists 3.2 Verbal questioning during service and repair activities to test underpinning knowledge 3.3 Short-answer tests to assess understanding of the operation of brake systems, measuring, assessing

	the condition of components and fault rectification.
4. Context of Assessment.	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions.
5. Guidance information for assessment.	This unit may be assessed on an integrated basis with others within this occupational sector.

SERVICE VEHICLE ELECTRICAL SYSTEMS

UNIT CODE: ENG/AUT/CR/8/6

UNIT DESCRIPTION:

This unit specifies competencies required to service vehicle electrical system. It involves, carrying out diagnostics, rectifications, replacements and installations of vehicle electrical systems and components.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1 Diagnose ***electrical systems***	1.1 Electrical defect(s) are identified according to client's report. 1.2 **Electrical diagnostic tools and equipment** are used as per the **service manual** 1.3 Diagnostic procedures are used as per service manual 1.4 Cause and location of defects is identified as per service manual
2 Service vehicle ignition system	2.1 Battery ***condition and functionality*** is checked according to manufacturer's specification. 2.2 Ignition coil is checked/ replaced according to manufacturer's specification. 2.3 Ignition distributor and distributor cap is

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	serviced according to manufacturer's specification. 2.4 Ignition spark plug and high tension (HT) cables are serviced as per manufacturer's manual. 2.5 Ignition switch/key is serviced/ replaced according to manufacturer's specification. 2.6 Ignition timing is carried out as per manufacturer's specification. 2.7 Electronic ignition fault diagnosis is performed as per manufacturer's manual.
3 Service vehicle electrical accessories	3.1 Electrical accessories are checked to confirm compatibility with the vehicle as per manufactures specifications 3.2 Electrical accessories are checked for compatibility with legal legislations as per state policies. 3.3 Location and fitting is identified in accordance with legislations and manufactures' specification 3.4 Accessories are installed in accordance with manufacturer's specification 3.5 Accessories are tested for correct operation as per manufacturer's

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	specification.
4 Service vehicle air-conditioning system	4.1 Air-con condenser and condenser cooling fans are checked/ serviced according to manufacturer's specifications. 4.2 Evaporator and heater blower fans are checked/ serviced according to manufacturer's specifications. 4.3 Compressor and pressure switch are checked/ serviced according to manufacturer's specifications. 4.4 Drier and expansion valve are checked/ serviced according to manufacturer's specification. 4.5 Air conditioner is recharged according to manufacturer's specification. 4.6 Air conditioner leakages are checked according to manufacturer's specification.
5 Service vehicle charging systems	5.1 Alternator is checked /serviced as per manufacturer's specification. 5.2 Alternator control box is checked/ serviced as per the manufacturer's specifications. 5.3 Charging system is tested according to manufacturer's specifications.
6. Service vehicle	6.1 Vehicle alarms and horns are

ELEMENT These describe the key outcomes which make the workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
auxiliary systems	checked / serviced according to manufacturer's specification. 6.2 Vehicle gauges are checked/ serviced according to manufacturer's specification. 6.3 Vehicle central locking is checked / serviced according to manufacturer's specification. 6.4 Radio and television are checked/ serviced / installed according to manufacturer's specification. 6.5 Power windows and power mirrors are checked/ serviced according to manufacturer's specifications. 6.6 Air bags are checked and replaced according to manufacturer's specifications.
7. Service vehicle lighting system	7.1 Main beam and dip beam switch is checked/ replaced according to manufacturer's specifications. 7.2 Connectors and wire harness are checked/ replaced according to manufacturer's specifications. 7.3 ***Main headlight***, interior lights and reverse lights are checked/ serviced / replaced according to

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	manufacturer's specifications. 7.4 Direction indicator lights and ***flasher unit*** are checked/ serviced/ replaced according to manufacturer's specifications. 7.5 Headlight beam setting is performed according to manufacturer's specifications.
8. Service vehicle electrical motors	8.1 Electrical motor faults are identified according to manufacturer's specifications. 8.2 Electrical motors are removed from the vehicle according to manufacturer's manual. 8.3 Electrical motors are serviced according to manufacturer's specifications. 8.4 Tests are performed on serviced electrical motors according to manufacturer's manual. 8.5 Electrical motors are installed on the vehicle as per manufacturer's specifications.
9. Install Vehicle safety systems	9.1 Install Airbags according to manufacturer's manual 9.2 Connect Safety belts according to workshop procedures

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
	9.3 Mount electrical components related to vehicle safety according to manufacturer's manual 9.4 Fit anti-roll components according to manufacturer's manual 9.5 The vehicle tracker according to manufacturer's manual

RANGE

This section provides work environments and conditions to which the performance criteria
apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Electrical Diagnostic Tools and equipment may include but is not limited to:	1.1 General workshop equipped for servicing vehicle electrical systems; 1.2 Electronic diagnostic equipment; 1.3 Multi-meters; 1.4 Ignition test equipment. 1.5 Hydrometer 1.6 High rate discharge tester 1.7 Feeler gauge
2. Service Manual may include but is not limited	2.1 Instructions provided by the manufacturer on how to remove,

Variable	Range
to:	disassemble, repair and refit components
3. Condition and functionality may include but is not limited to:	3.1 Specific gravity/hydrometer test 3.2 High rate discharge test
4. Technical information. may include but is not limited to:	3.1 Vehicle technical data; 3.2 Manufacturers' online information; 3.3 On-board diagnostics (OBD) displays; 3.4 Accessory manufacturers technical data
5. Electrical systems may include but is not limited to:	5.1 Starting system including motors and battery terminals; 5.2 Charging system including alternators; 5.3 Ignition system components including steering lock switches; 5.4 Audio systems including speakers; 5.5 Electrical wiring; 5.6 Lighting system including bulbs and sockets; 5.7 Electrical and electronic sensors; 5.8 Auxiliary motors including wipers, heater blowers, and window actuators.
6. Gauge may include but is not limited to:	6.1 Speedometer 6.2 Temperature gauge 6.3 Fuel level gauge 6.4 Oil pressure gauge
7. Electrical motors may include but is not limited to:	7.1 Starter motor 7.2 Wiper motor
8. Aftermarket accessories	8.1 GPS systems;

Variable	Range
may include but is not limited to:	8.2 Cameras; 8.3 Radios and speakers; 8.4 Auxiliary lights;
9. Headlights may include but is not limited to:	9.1 Sealed beam 9.2 Non-sealed beam
10. Flasher unit may include but is not limited to:	10.1 Hazard warning 10.2 Electronic type

REQUIRED KNOWLEDGE

The individual needs to demonstrate knowledge of:

- Legislative and organizational requirements and procedures
- Kenyan legislation and workplace procedures relevant to:
  - health and safety;
  - the environment (including waste disposal);
  - appropriate personal and vehicle protective equipment
- Legal requirements relating to the vehicle and its construction including brake operation and efficiencies
- Workplace procedures for:
  - recording fault location and correction activities;
  - reporting the results of tests;
  - the referral of problems;
  - reporting delays to the completion of work
- The importance of working to recognized assessment and rectification procedures and obtaining the correct information for rectification
- The importance of documenting assessment and rectification information.
- The importance of working to agreed timescales and keeping others informed of progress.
- The relationship between time, costs and profitability
- The importance of reporting anticipated delays to relevant person(s) promptly. The use of technical information including

- How to find, interpret and use sources of technical information for brake servicing activities
- The importance of using the correct sources of technical information
- The purpose of, and how to use identification codes
- Vehicle earthling principles and earthling methods
- Electrical and electronic principles associated with transmission systems, including types of sensors and actuators, their application and operation
- Types of circuit protection and why these are necessary.
- Electrical safety procedures electric symbols, units and terms
- Electrical and electronic control system principles
- The hazards associated with *high energy electrical component*.
- Operation of brake systems
- How brake and their related units and components are constructed, removed and replaced for the classification of vehicle worked upon
- Brake units and components removal and replacement
- How to remove and replace brake system mechanical, electrical and hydraulic units and components for the classification of vehicle worked upon
- How to select and use sealants, seals, fittings and fasteners
- How to test and evaluate the performance of replacement brake system units and components and the reassembled system against the vehicle
- Operating specifications and any legal requirements
- The use of appropriate test methods
- When replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
- How to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances

Required Skills

The individual needs to demonstrate the following skills

- Proficient in ICT;
- Time management;
- Problem solving;
- Communications (verbal and written);
- Planning;
- Decision making;
- Multitasking;
- First aid;
- Report writing;
    - Driving

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Problem solving;
- Planning;
- Decision making;
- Multitasking;
- First aid;
- Report writing;
    - Driving.

EVIDENCE GUIDE

This provides advice on assessment and must be in conjunction with the performance criteria,
required skills and knowledge and range.

1. Critical Aspects of Competency	***Assessment requires evidence that the candidate:*** 1.1 Worked in a safe and clean environment 1.2 Diagnosed vehicle electrical system 1.3 Rectified electrical defects 1.4 Installed aftermarket accessories 1.5 Generated and shared electrical system serving report
2. Resource Implications	***The following resources must be provided:*** General workshop equipped for servicing vehicle electrical systems; 2.2 Electronic diagnostic equipment; 2.3 Multi-meters; 2.4 Ignition test equipment.
3. Methods of Assessment	***Competency may be assessed through:*** 3.1 Observation with the use of checklists; 3.2 Verbal questioning during practical activities to test underpinning knowledge; 3.3 Short-answer tests to assess understanding of vehicle electrical systems, their construction and operating principles.
4. Context of Assessment	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions
5. Guidance information for	This unit may be assessed on an

assessment	integrated basis with others within this occupational sector.