THE REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

AUTOMOTIVE CRAFTSPERSON

LEVEL 5

TVET CDACC
P.O BOX 15745-00100
NAIROBI

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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 of Kenya's development blueprint, Vision 2030 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 of Kenya 2010 and this resulted in 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 Automotive Craftsperson Level 5. These Occupational Standards will also be the basis 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 Engineering sector's growth and 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. 14 of 2012 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a 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 labor force.

The TVET Curriculum Development, Assessment and Certification Council (TVET CDACC), in conjunction with Automotive Sector Skills Advisory Committee (SSAC have developed these Occupational Standards for Automotive Craftsperson. These standards will be the basis for development of Competency Based Curriculum for Automotive Technology Level 5.

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, Automotive SSAC, expert workers and all those who participated in the development of these Occupational Standards.

CHAIRMAN, TVET CDACC

ACKNOWLEDGMENT

These Occupational Standards were developed through combined effort of various stakeholders from private and public organizations. I am 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 Automotive 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.

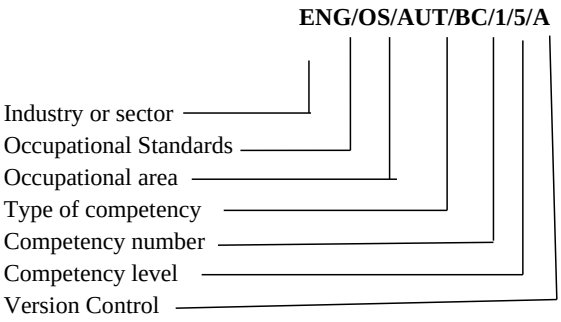
I acknowledge all other institutions which in one way or another contributed to the development of these Standards.

CHAIRPERSON,
AUTOMOTIVE SECTOR SKILLS ADVISORY COMMITTEE

ABBREVIATIONS AND 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
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



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OVERVIEW

The Automotive Craftsperson Level 5 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 Craftsperson certificate Level 5 qualifications include the following competencies:

Basic Units of Competency

Unit Code	Unit Title
ENG/OS/AUT/BC/1/5/A	Demonstrate Communication Skills
ENG/OS/AUT/BC/2/5/A	Demonstrate Digital Literacy
ENG/OS/AUT/BC/3/5/A	Demonstrate Entrepreneurial Skills
ENG/OS/AUT/BC/4/6/A	Demonstrate Employability Skills
ENG/OS/AUT/BC/5/5/A	Demonstrate Environmental Literacy
ENG/OS/AUT/BC/6/5/A	Demonstrate Occupational Safety and Health Practices

Common Units of Competency

Unit Code	Unit Title
ENG/OS/AUT/CC/1/5/A	Prepare and Interprate Technical Drawing
ENG/OS/AUT/CC/2/5/A	Apply Engineering Mathematics
ENG/OS/AUT/3/5/A	Apply Automotive Engineering Principles
ENG/OS/AUT/4/5/A	Apply Workshop Technology Principles

Core Units of Competency

Unit Code	Unit Title
ENG/OS/AUT/CR/1/5/A	Perform Vehicle Basic Maintenance
ENG/OS/AUT/CR/2/5/A	Service and Repair Vehicle Engine Components..
ENG/OS/AUT/CR/3/5/A	Service Vehicle Fuel Systems
ENG/OS/AUT/CR/4/5/A	Service Vehicle Transmission Systems
ENG/OS/AUT/CR/5/5/A	Service Vehicle Steering Systems.
ENG/OS/AUT/CR/6/5/A	Service Vehicle Suspension Systems.

ENG/OS/AUT/CR/7/5/A	Service Vehicle Braking Systems
ENG/OS/AUT/CR/8/5/A	Service Vehicle Electrical Sytems
ENG/OS/AUT/CR/8/5/A	Perform Vehicle body works
ENG/OS/AUT/CR/10/5/A	Industrial attachment

BASIC UNITS OF COMPETENCY

DEMONSTRATE COMMUNICATION SKILLS

UNIT CODE: ENG/OS/AUT/BC/1/5/A

UNIT DESCRIPTION

This unit covers the competencies required to demonstrate communication skills. It involves meeting communication needs of clients and colleagues, contributing to the development of communication strategies, conducting workplace interviews, facilitating group discussions and representing the organisation

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. Meet communication needs of clients and colleagues	1.1 Specific communication needs of clients and colleagues are identified and met based on workplace requirements 1.2 Different communication approaches are identified and applied according to clients' needs 1.3 Conflict is identified and addressed as per the standards of the organization
2. Contribute to the development of communication strategies	2.1 Strategies for internal and external dissemination of information are developed, promoted, implemented and reviewed as per organizations' strategic plan 2.2 Channels of communication are established and reviewed based on the workplace needs 2.3 Communication training needs are identified and provided according to SOPs 2.4 Work related network and relationship are maintained based on workplace requirements 2.5 Negotiation and conflict resolution strategies are maintained as per the workplace procedures
3. Conduct workplace interviews	3.1 ***Communication strategies*** are identified and employed in ***interview situations*** based on workplace requirements 3.2 Records of interviews are made and maintained in accordance with organizational procedures 3.3 Effective questioning, listening and nonverbal communication techniques are used based on needs
4. Facilitate group discussions	4.1 Mechanisms to enhance ***effective group interaction*** are identified and implemented according to workplace requirements

	4.2 Strategies to encourage group participation are identified and used as per organizations' procedures 4.3 Meetings objectives and agenda are set and followed based on workplace requirements 4.4 Relevant information is provided and feedback obtained according to set protocols 4.5 Evaluation of group communication strategies is undertaken in accordance with workplace guidelines 4.6 Specific communication needs of individuals are identified and addressed as per individual needs
5. Represent the organization	5.1 Relevant presentation are researched and presented based on internal or external communication forums requirements Presentation is delivered in a clear and sequential manner as per the predetermined time 5.2 Presentation is made as per appropriate media 5.3 Difference views are respected based on workplace procedures 5.4 Written communication is done as per organizational standards 5.5 Inquiries are responded according to organizational standard

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:	• Language switch • Comprehension check • Repetition • Asking confirmation • Paraphrase • Clarification request • Translation • Restructuring • Approximation • Generalization
2. Effective group interaction may include but not limited to:	• Identifying and evaluating what is occurring within an interaction in a non-judgmental way • Using active listening • Making decision about appropriate words, behavior

	• Putting together response which is culturally appropriate • Expressing an individual perspective • Expressing own philosophy, ideology and background and exploring impact with relevance to communication • Openness and flexibility in communication
3. Interview situations may include but not limited to:	• Establishing rapport • Eliciting facts and information • Facilitating resolution of issues • Developing action plans • 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:

- Active listening
- Giving/receiving feedback
- Interpretation of information
- Role boundaries setting
- Negotiation
- Communication

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

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 Met communication needs of clients and colleagues 1.2 Contributed to the development of communication strategies 1.3 Conducted interviews 1.4 Facilitated group discussions 1.5 Represented the organization
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 Observation 3.2 Oral questioning 3.3 Written test 3.4 Portfolio of Evidence 3.5 Interview 3.6 Third party report
4. Context of Assessment	Competency may be assessed 4.1 On the job 4.2 Off the job 4.3 During industrial attachment
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/2/5/A

UNIT DESCRIPTION

This unit covers the competencies required to demonstrate digital literacy. It involves identifying appropriate computer software and hardware, applying security measures to data, hardware, software in automated environment, applying computer software in solving tasks, applying internet and email in communication at workplace, applying desktop publishing in official assignment and preparing presentation packages**.**

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 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 manufacturers specification 1.3 ***Appropriate computer software*** is identified according to manufacturer's specification 1.4 ***Appropriate computer hardware*** is identified according to manufacturer's specification 1.5 Functions and commands of operating system are determined in accordance with manufacturer's specification
2. Apply security measures to data, hardware, 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 in accordance with Information security management guidelines 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 as per job requirements 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 Worksheet is build and data manipulated in the worksheet in accordance with workplace 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 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 hardware may include but not limited to:	• Computer case • Monitor • keyboard • mouse

2. Data security and privacy may include but not limited to:	• Confidentiality of data • Cloud computing • Integrity -but-curious data surfing
3. Security and control measures may include but not limited to:	• Counter measures against cyber terrorism • Risk reduction • Cyber threat issues • Risk management • Pass wording
4. Security threats may include but not limited to:	• Cyber terrorism • Hacking

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
- 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
- Microsoft suite

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 Implications	2.1 Tablets 2.2 Laptops 2.3 Desktop computers 2.4 Calculators 2.5 Internet 2.6 Smart phones 2.7 Operation Manuals
3. Methods of Assessment	Competency may be assessed through: 3.1 Written Test 3.2 Observation 3.3 Practical assignment 3.4 Interview/Oral Questioning
4. Context of Assessment	Competency may be assessed in: 4.1 Off the job 4.2 On the job setting 4.3 Industrial attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE ENTREPRENEURAL SKILLS

UNIT CODE : ENG/OS/AUT/BC/3/5/A

UNIT DESCRIPTION

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

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Demonstrate understanding of an Entrepreneur	1.1 Entrepreneurs and Businesspersons are distinguished as per principles of entrepreneurship 1.2 ***Types of entrepreneurs*** are identified as per principles of entrepreneurship 1.3 Ways of becoming an Entrepreneur are identified as per principles of Entrepreneurship 1.4 ***Characteristics of Entrepreneurs*** are identified as per principles of Entrepreneurship 1.5 Factors affecting Entrepreneurship development are explored as per principles of Entrepreneurship
2. Demonstrate understanding of Entrepreneurship and self-employment	2.1 Entrepreneurship and self-employment are distinguished as per principles of entrepreneurship 2.2 Importance of self-employment is analysed based on business procedures and strategies 2.3 ***Requirements for entry into self-employment*** are identified according to business procedures and strategies 2.4 Role of an Entrepreneur in business is determined according to business procedures and strategies 2.5 Contributions of Entrepreneurs to National development are identified as per business procedures and strategies 2.6 Entrepreneurship culture in Kenya is explored as per business procedures and strategies 2.7 Born or made Entrepreneurs are distinguished as per entrepreneurial traits
3. Identify Entrepreneurship opportunities	3.1 Sources of business ideas are identified as per business procedures and strategies 3.2 Business ideas and opportunities are generated as per business procedures and strategies

	3.3 Business life cycle is analysed as per business procedures and strategies 3.4 Legal aspects of business are identified as per procedures and strategies 3.5 Product demand is assessed as per market strategies 3.6 Types of ***business environment*** are identified and evaluated as per business procedures 3.7 Factors to consider when evaluating business environment are explored based on business procedure and strategies 3.8 Technology in business is incorporated as per best practice
4. Create entrepreneurial awareness	4.1 ***Forms of businesses*** are explored as per business procedures and strategies 4.2 Sources of business finance are identified as per business procedures and strategies 4.3 Factors in selecting source of business finance are identified as per business procedures and strategies 4.4 ***Governing policies*** on Small Scale Enterprises (SSEs) are determined as per business procedures and strategies 4.5 Problems of starting and operating SSEs are explored as per business procedures and strategies
5. Apply entrepreneurial motivation	5.1 ***Internal and external motivation*** factors are determined in accordance with motivational theories 5.2 Self-assessment is carried out as per entrepreneurial orientation 5.3 Effective communications are carried out in accordance with communication principles 5.4 Entrepreneurial motivation is applied as per motivational theories
6. Develop innovative business strategies	6.1 Business innovation strategies are determined in accordance with the organization strategies 6.2 Creativity in business development is demonstrated in accordance with business strategies 6.3 ***Innovative business strategies*** are developed as per business principles 6.4 Linkages with other entrepreneurs are created as per best practice

	6.5 ICT is incorporated in business growth and development as per best practice
7. Develop Business Plan	7.1 Identified Business is described as per business procedures and strategies 7.2 Marketing plan is developed as per business plan format 7.3 Organizational/Management plan is prepared in accordance with business plan format 7.4 Production/operation plan in accordance with business plan format 7.5 Financial plan is prepared in accordance with the business plan format 7.6 Executive summary is prepared in accordance with business plan format 7.7 Business plan is presented as per best practice

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.

1. Variable	**Range**
2. Types of entrepreneurs may include but not limited to:	• Innovators • Imitators • Craft • Opportunistic • Speculators
3. Characteristics of Entrepreneurs may include but not limited to:	• Creative • Innovative • Planner • Risk taker • Networker • Confident • Flexible • Persistent • Patient • Independent • Future oriented • Goal oriented
4. Requirements for entry into self-employment may include but not limited to	• Technical skills • Management skills • Entrepreneurial skills • Resources • Infrastructure

5. Internal and external motivation may include but not limited to:	• Interest • Passion • Freedom • Prestige • Rewards • Punishment • Enabling environment • Government policies
6. Business environment may include but not limited to:	• External • Internal • Intermediate
7. Forms of businesses may include but not limited to:	• Sole proprietorship • Partnership • Limited companies • Cooperatives
8. Governing policies may include but not limited to:	• Increasing scope for finance • Promoting cooperation between entrepreneurs and private sector • Reducing regulatory burden on entrepreneurs • Developing IT tools for entrepreneurs
9. Innovative business strategies may include but not limited to:	• New products • New methods of production • New markets • New sources of supplies • Change in industrialization

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
- Management
- Problem-solving
- Root-cause analysis
- Communication

Required Knowledge

The individual needs to demonstrate knowledge of:

- Decision making
- Business communication
- Change management
- Competition
- Risk
- Net working
- Time management
- Leadership
- Factors affecting entrepreneurship development
- Principles of Entrepreneurship
- Features and benefits of common operational practices, e. g., continuous improvement (kaizen), waste elimination,
- Conflict resolution
- Health, safety and environment (HSE) principles and requirements
- Customer care strategies
- Basic financial management
- Business strategic planning
- Impact of change on individuals, groups and industries
- Government and regulatory processes
- Local and international market trends
- Product promotion strategies
- Market and feasibility studies
- Government and regulatory processes
- Local and international business environment
- Relevant developments in other industries
- Regional/ County business expansion 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 Distinguished entrepreneurs and business persons correctly 1.2 Identified ways of becoming an entrepreneur appropriately 1.3 Explored factors affecting entrepreneurship development appropriately 1.4 Analysed importance of self-employment accurately 1.5 Identified requirements for entry into self-employment correctly 1.6 Identified sources of business ideas correctly

	1.7 Generated Business ideas and opportunities correctly 1.8 Analysed business life cycle accurately 1.9 Identified legal aspects of business correctly 1.10 Assessed product demand accurately 1.11 Determined Internal and external motivation factors appropriately 1.12 Carried out communications effectively 1.13 Identified sources of business finance correctly 1.14 Determined Governing policy on small scale enterprise appropriately 1.15 Explored problems of starting and operating SSEs effectively 1.16 Developed Marketing, Organizational/Management, Production/Operation and Financial plans correctly 1.17 Prepared executive summary correctly 1.18 Determined business innovative strategies appropriately 1.19 Presented business plan effectively
2. Resource Implications	2.1 The following resources should be provided: 2.2 Access to relevant workplace where assessment can take place 2.3 Appropriately simulated environment where assessment can take place
3. Methods of Assessment	3.1 Written tests 3.2 Oral questions 3.3 Third party report 3.4 Interviews 3.5 Portfolio
4. Context of Assessment	Competency may be assessed 4.1 On-the-job 4.2 Off-the –job 4.3 During Industrial attachment
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/AUT/BC/4/5/A

Unit Description

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

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. Conduct self-management	1.1 Personal vision, mission and goals are formulated based on potential and in relation to organization objectives 1.2 Emotional intelligence is demonstrated as per workplace requirements. 1.3 Individual performance is evaluated and monitored according to the agreed targets. 1.4 Assertiveness is developed and maintained based on the requirements of the job. 1.5 Accountability and responsibility for own actions are demonstrated based on workplace instructions. 1.6 Self-esteem and a positive self-image are developed and maintained based on values. 1.7 Time management, attendance and punctuality are observed as per the organization policy. 1.8 Goals are managed as per the organization's objective 1.9 Self-strengths and weaknesses are identified based on personal objectives
2. Demonstrate interpersonal communication	2.1 Writing skills are demonstrated as per communication policy 2.2 Negotiation and persuasion skills are demonstrated as per communication policy 2.3 Internal and external stakeholders' needs are identified and interpreted as per the communication policy 2.4 Communication networks are established based on workplace policy 2.5 Information is shared as per communication policy

3. Demonstrate critical safe work habits	3.1 Stress is managed in accordance with workplace policy. 3.2 Punctuality and time consciousness is demonstrated in line with workplace policy. 3.3 Personal objectives are integrated with organization goals based on organization's strategic plan. 3.4 ***Resources*** are utilized in accordance with workplace policy. 3.5 Work priorities are set in accordance to workplace goals and objectives. 3.6 Leisure time is recognized and utilized in line with personal objectives. 3.7 ***Drugs and substances of abuse*** are identified and avoided based on workplace policy. 3.8 HIV and AIDS prevention awareness is demonstrated in line with workplace policy. 3.9 Safety consciousness is demonstrated in the workplace based on organization safety policy. 3.10 ***Emerging issues*** are identified and dealt with in accordance with organization policy.
4. Lead small teams	4.1 Performance targets for the ***team*** are set based on organization's objectives 4.2 Duties are assigned in accordance with the organization policy. 4.3 ***Forms of communication*** in a team are established according to organization's policy. 4.4 Team performance is evaluated based on set targets as per workplace policy. 4.5 Conflicts are resolved between team members in line with organization policy. 4.6 Gender related issues are identified and mainstreamed in accordance workplace policy. 4.7 Human rights and fundamental freedoms are identified and respected as Constitution of Kenya 2010. 4.8 Healthy relationships are developed and maintained in line with workplace.
5. Plan and organize work	5.1 Task requirements are identified as per the workplace objectives 5.2 Task is interpreted in accordance with safety (OHS), environmental requirements and quality requirements 5.3 Work activity is organized with other involved personnel as per the SOPs 5.4 Resources are mobilized, allocated and utilized to meet project goals and deliverables. 5.5 Work activities are monitored and evaluated in line with organization procedures.

	5.6 Job planning is documented in accordance with workplace requirements. 5.7 Time is managed achieve workplace set goals and objectives.
6. Maintain professional growth and development	6.1 Personal training needs are identified and assessed in line with the requirements of the job. 6.2 ***Training and career opportunities*** are identified and utilized based on job requirements. 6.3 Resources for training are mobilized and allocated based organizations and individual skills needs. 6.4 Licensees and certifications relevant to job and career are obtained and renewed as per policy. 6.5 Work priorities and personal commitments are balanced and managed based on requirements of the job and personal objectives. 6.6 Recognitions are sought as proof of career advancement in line with professional requirements.
7. Demonstrate workplace learning	7.1 Learning opportunities are sought and managed based on job requirement and organization policy. 7.2 Improvement in performance is demonstrated based on courses attended. 7.3 Application of learning is demonstrated in both technical and non-technical aspects based on requirements of the job 7.4 Time and effort is invested in learning new skills based on job requirements 7.5 Initiative is taken to create more effective and efficient processes and procedures in line with workplace policy. 7.6 New systems are developed and maintained in accordance with the requirements of the job. 7.7 Awareness of personal role in workplace ***innovation*** is demonstrated based on requirements of the job.
8. Demonstrate problem solving skills	8.1 Creative, innovative and practical solutions are developed based on the problem 8.2 Independence and initiative in identifying and solving problems is demonstrated based on requirements of the job. 8.3 Team problems are solved as per the workplace guidelines 8.4 Problem solving strategies are applied as per the workplace guidelines 8.5 Problems are analyzed and assumptions tested as per the context of data and circumstances
9. Demonstrate workplace ethics	9.1 Policies and guidelines are observed as per the workplace requirements

	9.2 Self-worth and professionalism is exercised in line with personal goals and organizational policies 9.3 Code of conduct is observed as per the workplace requirements 9.4 Integrity is demonstrated as per legal requirement

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.

Range	**Variable**
1. Drug and substance abuse may include but not limited to:	• Alcohol • Tobacco • Miraa • Over-the-counter drugs • Cocaine • Bhang • Glue
2. Feedback may include but not limited to:	• Verbal • Written • Informal • Formal
3. Relationships may include but not limited to:	• Man/Woman • Trainer/trainee • Employee/employer • Client/service provider • Husband/wife • Boy/girl • Parent/child • Sibling relationships
4. Forms of communication may include but not limited to:	• Written • Visual • Verbal • Non verbal • Formal and informal
5. Team may include but not limited to:	• Small work group • Staff in a section/department • Inter-agency group

6. Personal growth may include but not limited to:	• Growth in the job • Career mobility • Gains and exposure the job gives • Net workings • Benefits that accrue to the individual as a result of noteworthy performance
7. Personal objectives may include but not limited to:	• Long term • Short term • Broad • Specific
8. Trainings and career opportunities may include but not limited to	• Participation in training programs • Technical • Supervisory • Managerial • Continuing Education • Serving as Resource Persons in conferences and workshops
9. Resource may include but not limited to:	• Human • Financial • Hardware • Software
10. Innovation may include but not limited to:	• New ideas • Original ideas • Different ideas • Methods/procedures • Processes • New tools
11. Emerging issues may include but not limited to:	• Terrorism • Social media • National cohesion • Open offices
12. Range of media for learning may include but not limited to:	• Mentoring • peer support and networking • IT and courses

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:

- Communication
- Critical thinking
- Observation
- Organizing
- Negotiation
- Monitoring
- Evaluation
- Record keeping
- Problem solving
- Decision Making
- Resource utilization
- Resource mobilization

Required Knowledge

The individual needs to demonstrate knowledge of:

- Work values and ethics
- Company policies
- Company operations, procedures and standards
- Occupational Health and safety procedures
- Fundamental rights at work
- Personal hygiene practices
- Workplace communication
- Concept of time
- Time management
- Decision making
- Types of resources
- Work planning
- Resources and allocating resources
- Organizing work
- Monitoring and evaluation
- Record keeping
- Workplace problems and how to deal with them
- Gender mainstreaming
- HIV and AIDS
- Drug and substance abuse
- Leadership
- Safe work habits
- Professional growth and development
- Technology in the workplace

- Emerging issues
- Social media
- Terrorism
- National cohesion

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 Conducted self-management 1.2 Demonstrated interpersonal communication 1.3 Demonstrated critical safe work habits 1.4 Led small teams 1.5 Planned and organized work 1.6 Maintained professional growth and development 1.7 Demonstrated workplace learning 1.8 Demonstrated problem solving skills 1.9 Demonstrated workplace ethics
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace where assessment can take place 2.2 Appropriately simulated environment where assessment can take place
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Oral questioning 3.2 Portfolio of evidence 3.3 Third Party Reports 3.4 Written tests
4. Context of Assessment	Competency may be assessed 4.1 On-the-job 4.2 Off-the –job 4.3 During Industrial attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE ENVIRONMENTAL LITERACY

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

UNIT DESCRIPTION

This unit describes the competencies required to demonstrate understanding of environmental literacy. It involves controlling environmental hazard, controlling control environmental pollution, complying with workplace sustainable resource use, evaluating current practices in relation to resource usage, identifying environmental legislations/conventions for environmental concerns, implementing specific environmental programs and monitoring activities on environmental protection/programs.

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. 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 always according to environmental regulations and OSHS. 1.3 ***PPE*** is used according to OSHS.
2. Control environmental Pollution control	2.1 Environmental pollution ***control measures*** are compiled following standard protocol. 2.2 Procedures for solid waste management are observed according to Environmental Management and Coordination Act 1999 2.3 Methods for minimizing ***noise pollution*** is complied with based on *Noise* and Excessive Vibration *Pollution and Control Regulations*, 2009
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, Recycle) 3.3 Methods for economizing and reducing resource consumption are practiced as per the Environmental Management and Coordination Act 1999

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 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 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

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:	• Mask • Gloves • Goggles • Safety hat • Overall • Hearing protector • Safety boots
2. Environmental pollution control measures may include but not limited to:	• Methods for minimizing or stopping spread and ingestion of airborne particles • Methods for minimizing or stopping spread and ingestion of gases and fumes • Methods for minimizing or stopping spread and ingestion of liquid wastes
3. Waste management procedures may include but not limited to:	• Sorting • Storing of items • Recycling of items • Disposal of items
4. Resources may include but not limited to:	• Electric • Water • Fuel • Telecommunications • Supplies • Materials
5. Workplace environmental hazards may include but not limited to:	• Biological hazards • Chemical and dust hazards • Physical hazards
6. Organizational systems and procedures may include but not limited to:	• Supply chain, procurement and purchasing • Quality assurance • Making recommendations and seeking approvals

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:

- Observation
- Measuring
- Writing
- Communication
- Analytical
- Monitoring
- Evaluation

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
- Solid Waste Act
- Methods of minimizing wastage
- Waste management procedures
- Economizing of resource consumption
- 3Rs principle
- 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.
- Measurement and recording of current resource usage
- 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

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 (ex. Cleaning tools, cleaning materials, trash bags, etc.) 2.3 PPE 2.4 Manuals and references 2.5 Legislation, policies, procedures, protocols and local ordinances relating to environmental protection 2.6 Case studies/scenarios relating to environmental Protection

3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Written test 3.4 Interview/Third Party Reports 3.5 Portfolio of evidence
4. Context of Assessment	Competency may be assessed 4.1 On-the-job 4.2 Off-the –job 4.3 During Industrial attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE OCCUPATIONAL SAFETY AND HEALTH PRACTICES

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

UNIT DESCRIPTION

This unit specifies the competencies required to identify workplace hazards and risk, identify and implement appropriate control measures and implement OSH programs, 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 and risk	1.1 ***Hazards*** in the workplace are identified ***based their indicators*** 1.2 Risks and hazards are evaluated based on legal requirements. 1.3 ***OSH concerns*** raised by workers are addressed as per legal requirements.
2. Control OSH hazards	2.1 Hazard prevention ***and control measures*** are implemented as per legal requirement. 2.2 Risk assessment is conducted and a risk matrix developed based on likely impact. 2.3 ***Contingency measures***, including ***emergency procedures*** during workplace ***incidents and emergencies*** are recognized and established in accordance with organization procedures.
3. Implement OSH programs	3.1 Company OSH program are identified, evaluated and reviewed based on legal requirements. 3.2 Company OSH programs are implemented as per legal requirements. 3.3 Workers are capacity built on OSH standards and procedures as per legal requirements 3.4 ***OSH-related records*** are maintained as per legal 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. Hazards may include but are not limited to:	• Physical hazards • Biological hazards • Chemical hazards • Ergonomics • Psychological factors • Physiological factors • Safety hazards • Unsafe workers' act
2. Indicators may include but are not limited to:	• Increased of incidents of accidents, injuries • Increased occurrence of sickness or health complaints/ symptoms • Common complaints of workers related to OSH • High absenteeism for work-related reasons
3. Evaluation and/or work environment measurements may include but are not limited to:	• Health Audit • Safety Audit • Work Safety and Health Evaluation • Work Environment Measurements of Physical and Chemical Hazards
4. OSH issues and/or concerns may include but are not limited to:	• Workers' experience/observance on presence of work hazards • Unsafe/unhealthy administrative arrangements (prolonged work hours, no break time, constant overtime, scheduling of tasks) • Reasons for compliance/non-compliance to use of PPEs or other OSH procedures/policies/guidelines
5. Prevention and control measures may include but are not limited to:	• Eliminate the hazard • Isolate the hazard • Substitute the hazard with a safer alternative • Use administrative controls to reduce the risk • Use engineering controls to reduce the risk • Use personal protective equipment • Safety, Health and Work Environment Evaluation • Periodic and/or special medical examinations of workers

6. Safety gears /PPE (Personal Protective Equipment's) may include but are not limited to:	• Arm/Hand guard, gloves • Eye protection (goggles, shield) • Hearing protection (ear muffs, ear plugs) • Hair Net/cap/bonnet • Hard hat • Face protection (mask, shield) • Apron/Gown/coverall/jump suit • Anti-static suits • High-visibility reflective vest
7. Appropriate risk controls	• Eliminate the hazard altogether • Isolate the hazard from anyone who could be harmed • Substitute the hazard with a safer alternative • Use administrative controls to reduce the risk • Use engineering controls to reduce the risk • Use personal protective equipment
8. Contingency measures may include but are not limited to:	• Evacuation • Isolation • Decontamination • Emergency personnel
9. Emergency procedures may include but are not limited to:	• Fire drill • Earthquake drill • Basic life support/CPR • First aid • Spillage control • Decontamination of chemical and toxic • Disaster preparedness/management • Set of fire-extinguisher
10. Incidents and emergencies may include but are not limited to:	• Chemical spills • Equipment/vehicle accidents • Explosion • Fire • Gas leak • Injury to personnel • Structural collapse • Toxic and/or flammable vapors emission.
11. OSH-related Records may include but are not limited to:	• Medical/Health records • Incident/accident reports • Sickness notifications/sick leave application • 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:

- Communication
- Interpersonal
- Presentation
- Risk assessment
- Evaluation
- Critical thinking
- Problem solving
- Negotiation

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 counseling 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 Identified hazards in the workplace based their indicators 1.2 Evaluated workplace hazards based on legal requirements. 1.3 Addressed OSH concerns raised by workers as per legal requirements. 1.4 Implemented hazard prevention and control measures as per legal requirement. 1.5 Conducted risk assessment as per legal requirement. 1.6 Developed risk matrix based on likely impact.

	1.7 Recognized and established contingency measures in accordance with organization procedures. 1.8 Identified, evaluated and reviewed company OSH program based on legal requirements. 1.9 Implemented company OSH programs as per legal requirements. 1.10 Capacity built workers on OSH standards and procedures as per legal requirements 1.11 Maintained OSH-related records as per legal requirements.
2. Resource Implications	2.1 The following resources should be provided: 2.2 Access to relevant workplace where assessment can take place 2.3 Appropriately simulated environment where assessment can take place
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Written test 3.4 Portfolio of Evidence 3.5 Interview 3.6 Third party report
4. Context of Assessment	Competency may be assessed 4.1 On-the-job 4.2 Off-the –job 4.3 During Industrial attachment
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/1/5/A

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	**PERFORMANCE CRITERIA** *(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 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 2.6 Sketches and drawings of patterns are interpreted according to standard conventions 2.7 Patterns are developed in accordance with standard conventions
3. Produce pictorial and orthographic drawings of components	3.1 Different **symbols and abbreviations** are identified, and their meaning interpreted according to standard drawing conventions

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
	3.2 **Isometric sketches and drawings** of components are interpreted and produced in accordance with the standard conventions of isometric drawings 3.3 First and third angle orthographic sketches and drawings of components are interpreted and produced in accordance with the standard conventions of orthographic drawings 3.4 Freehand sketching of different types of geometric forms, tools, equipment, diagrams and components is conducted
4. Produce assembly drawings	4.1 Orthographic views are exploded according to standard conventions of **orthographic drawings.** 4.2 **Pictorial views** are exploded according to standard conventions of orthographic drawings. 4.3 Part lists are identified according to part to be produced 4.4 **Sectional views** are produced according to standard conventions of drawing. 4.5 Produced drawing is hatched according to standard conventions of drawings.
5. Apply CAD packages in drawing	5.1 **CAD packages** are selected according to task requirements 5.2 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 is not limited to:	• Drawing boards • T-square • Set squares • Drawing set • Computers with CAD packages
2. Drawing materials may include but is not limited to:	• Drawing papers • Pencils • Erasers • Masking tapes • Paper clips
3. Types lines may include but is not limited to:	• Boarder lines • Faint continuous lines

Variable	Range
	• Broken lines • Chain lines • Centre lines • Cutting lines
4. Types of Angles may include but is not limited to:	• 30 degrees • 45 degrees • 60 degrees • 90 degrees • 180 degrees
5. Symbols and abbreviations may include but is not limited to:	• First angle • Third angle • E,g, of abbreviations Scale- 1:2 Diameter – D20 Radius -R20
6. Isometric sketches and drawings may include but is not limited to:	• Use of 30 degrees
7. Orthographic drawings. may include but is not limited to:	• Front view • End view • Plan view
8. Pictorial views may include but is not limited to:	• Front view • End view • Plan view
9. Sectional views may include but is not limited to:	• Cutting lines • Assembled view
10. CAD packages may include but is not limited to:	• Modifying tools • 2D • Roster tool • Layout space • Drawing tool
11. Environmental legislations may include but is not limited to:	• EMCA 1999 • OSHA 2007
12. Personal Protective Equipment may include but is not limited to:	• Dust coats • Closed leather shoes • Goggles for CAD
13. Geometric forms may include but is not limited to:	• Circles • Triangles • Rectangles • Parallelogram

Variable	Range
	• Polygons • Pyramids • Conic sections • Prisms • Loci
14. Standard drawing conventions	• Anatomy of engineering drawing (title block, coordinate grid system, revision block, notes and legends) • 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 or during Indudtrial Attachment.
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/2/5

UNIT DESCRIPTION:

This unit describes the competencies required by a Craftsperson 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
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

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.*
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
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.
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 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	1.1 Power series are obtained using Taylor's Theorem 1.2 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 10.2Calculations are performed based on Laws of probability 10.3Calculation involving ***probability distributions*** , mathematical expectation sampling distributions are performed 10.4Sampling distribution methods are applied in data analysis 10.5Calculations involving use of standard normal table, sampling distribution, T-distribution and Estimation are done

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.*
	10.6Confidence intervals are determined
11. Apply Numerical methods	1.1 Roots of polynomials are obtained using iterative ***numerical methods*** 1.2 Interpolation and extrapolation are performed using numerical methods
12. Apply Vector theory	12.1Vectors and scalar quantities are obtained in two dimensions 12.2***Operations*** on vectors are performed 12.3Position of vectors is obtained 12.4Resolution 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:	• Addition • Subtraction
Probability Distributions may include but not limited to:	• Binomial • Poisson • Normal
2. Numerical Methods may include but not limited to:	• Newton Raphson • 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: 1.1 Applied Trigonometry and hyperbolic functions 1.2 Applied complex numbers 1.3 Applied Calculus 1.4 Solved Ordinary differential equations 1.5 Carried out mensuration 1.6 Applied Power Series 1.7 Applied Vector theory 1.8 Applied Matrix 1.9 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
2. Methods of Assessment	Competency in this unit may be assessed through: 1.1 Direct Observation

	1.2 Oral Questioning 1.3 Written tests
Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution or during Industrial Attachment.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

APPLY AUTOMOTIVE ENGINEERING PRINCIPLES

UNIT CODE: ENG/OS/AUT/CC/3/05/A

UNIT DESCRIPTION

This unit describes the competencies required by a Craftsperson in order to apply a wide range of automotive science principles in their work. It includes resolve forces, Determine effects of loads in automotive systems, Analyse properties of materials, determine the nature of friction in automotive systems, solve problems related to motion, apply simple machines concepts, determine the effect of heat and gas laws and use the concept of density and pressure.

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
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 4,4Tools 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 different situations.

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***.
	5.5 Relationship between linear and angular motion is established from formula
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 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
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

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:	• Pulleys • Levers • Wedge • Screws • Wheel and axle • Inclined plane
2. Principles may include but not limited to:	• Newton's laws of motion • Law of conservation of momentum • Law of conservation of energy • Archimedes' principle • Triangle of forces theorem • Parallelogram of forces law • Polygon of forces theorem

	• Principle of moments • Bow's notation • Gas laws
3. calculations may include but not limited to:	• Mechanical advantage • Velocity ratio • Efficiency • Torque • Power/Energy • Work • Quantity of heat • Velocity and acceleration • Stress and strain
4. Types of forces may include but not limited to:	• Friction • Centrifugal • Centripetal • Gravitational • Inertia • Shear
5. properties of materials may include but not limited to:	• Elasticity • Tensile strength • Young modulus • Brittleness • Compressive strength • Shear strength • Plasticity • Modulus of rigidity
6. Parameters may include but not limited to:	• Density • Temperature • Viscosity • Pressure
7. Power transmission systems may include but not limited to:	• Pulleys • Clutches • Gears • Winches • Chains • 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:

- Use of basic mechanical machines
- Design Basic mechanical systems
- simple machine operations
- Logical thinking
- Problem solving
  - Using different measuring tools
  - Operation of mechanical machines

Required knowledge

The individual needs to demonstrate knowledge of:

- Newton's laws of motion
- Apply basic automotive engineering formulas
- Perform various unit conversions of engineering quantities
- 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
- 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: 3.1 Observation 3.2 Oral Questioning 3.3 Case studies 3.4 Written tests
Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution or in industrial attachment
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 /05/A

Unit description

This unit describes the competencies required by an automotive Craftsperson 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.
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

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***
	6.3 ***Threads are*** cut to specification
7. Assemble metal parts and sub-assemblies	7.1 Parts ***joined***, fitted and assembled 7.2 Final assembly inspected as per specification
8. Polish finished work	8.1 ***Polishing*** material are selected 8.2 Finished work is cleaned 8.3 Finished work is polished to specification
9. Perform housekeeping	9.1 Waste is segregated and disposed as per disposal guidelines. 9.2 Housekeeping is carried out as per workplace requirement
10. Inspect finished work for accuracy and quality	10.1 Inspection tools and methods selected as per operation plan 10.2 Finished work is inspected as per specification 10.3 Adjustments are made based on inspections results
11. Maintenance of tools and equipment	11.1 Machines and tools are lubricated 11.2 Tools are ground to specification 11.3 Faults on tools are identified and reported 11.4 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 not limited to:	• Steel rule • Vernier calliper • Micrometre screw gauge • Vernier height gauge • Combination set • Bevels
2. Drawing Standards may include but not limited to:	• ISO • BS • ANSI
3. Operation Plan may include but not limited to:	• Sequence of operations • Measuring tools • Hand tools • Cutting tools

VARIABLE	RANGE
	• Inspection tools
4. Marking out tools may include but not limited to:	• Scribers • Dividers • Dot punch • Centre punch • Engineers square • Straight edge • Surface plate
5. Work holding devices may include but not limited to:	• Bench vice • V-Block • Angle plate • G-clamp • Jigs and fixtures • Hand vice
6. Hand tools may include but not limited to:	• Files • Saws • Hammers • Chisels • Taps and dies
7. Machine tools may include but not limited to:	• Drilling machines • Grinding machine
8. Threads may include but not limited to:	• Internal and external threads • V-profile threads
9. Polishing may include but not limited to:	• Emery cloth • Polishing and burnishing machine • Filing
10. Hole drilled may include but not limited to:	• Location • Counter sinking • Counter boring • Reaming • Boring
11. Joined may include but not limited to:	• Riveting • Fastening • Soldering • Brazing • Welding
12. Specifications may include but not limited to:	• Dimensions • Tolerances • Geometry • Surface finish

VARIABLE	RANGE
	• 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 work piece 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	2.1 Hand measuring tools 2.2 Hand marking tools 2.3 Hand tools 2.4 Inspection tools and equipment 2.5 Hand drilling machine 2.6 Bench Drilling machine 2.7 Grinding machine 2.8 Work benches
3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Oral presentations 3.3 Written Tests
4 Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution or during Industrial Attachment
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/1/5/A

Unit description

This unit specifies the competencies required to perform vehicle basic maintenance. It involves assess vehicle mechanical and operational condition, carry out diagnostic tests, service vehicle lubrication system, replenish fluids and lubricants, replace/service vehicle service parts, conduct road tests, service Vehicle Wheels and Tyres and finalize service and repair procedures.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA *(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 job card is prepared as per organizations ***approved format***
2. Carry out diagnostic tests	2.1 Service ***technical information*** is sourced as per service manual 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 job card is prepared and shared per the organization policy
3. Service vehicle lubrication system	3.1 Vehicle lubrication system is diagnosed according to manufacturer' manual 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 identified according to manufacturer's specifications 4.2 Lubricants for engines and transmissions are obtained using vehicle manufacturers' specifications 4.3 Grades of fluids for brakes and clutch operation, power assisted steering, cooling system, wind screen washers are identified and obtained as per Manufactures' technical information

ELEMENT	PERFORMANCE CRITERIA ***(Bold and italicized terms are elaborated in the Range)***
	4.4 Protective measures on lubricants and fluids are applied as per OSHA 2007 and the workplace rules 4.5 Lubricants and fluids are replenished as prescribed by vehicle manufacturers' specifications. 4.6 Waste oil and fluids are disposed in compliance with OSHA 2007 and workplace policy/rules
5. Replace/service vehicle serviceable parts	5.1 Tools and equipment for use are selected, obtained and assembled based on service manual 5.2 *Vehicle service parts* are identified, verified, replaced and adjusted as per manufacturer's part numbers. 5.3 Worn out/damage parts are disposed as per the workplace policy and OSHA 2007 5.4 Replace/service activities are completed within agreed time frame as per organization policy
6. Carry out vehicle component and system adjustments	6.1 Operating specification and tolerance are identify as per Manufacturers technical information 6.2 Tools and equipment foe checking and carrying out adjustments are identified as per activities 6.3 Components and systems are identified as per job task
7 Service Vehicle Wheels and Tyres	7.1 Identify and repair tyre punctures according to vehicles fault 7.2 Perform wheel balancing according to standard operating procedures 7.3 Perform tyre fitting on the rim according to SOP 7.4 Straighten bent wheel rims according to SOP 7.5 Replace tyre pressure nozzles according to SOP 7.6 Maintain tyre pressure according to manufacturer's specifications.
8. Finalize service and repair procedures.	7.1 Vehicle interior and exterior is cleaned and made presentable in compliance with company policy 7.2 Vehicle service and repair job card is prepared and shared as per the organizations requirement 7.3Service 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:	• Vehicle technical data; • Manufacturers' online information; • Schedules of inspection; • Legal regulations • On-board diagnostics (OBD) displays.
2. Assessment methods may include but is not limited to:	• Aural (noise); • Visual • Vibration • Digital diagnostic equipment • Functional • Measurement
3. Periodic maintenance may include but is not limited to:	• Brake pads/linings • fluid leaks • noise and vibration • air-conditioning • gas leaks • Tire wear • 3.7 fan belt
4. Vehicle systems may include but is not limited to:	• Engine management (fuel, ignition, emission control) • Battery, charging and starter • Engine cooling • Steering and suspension • Air conditioning; • Lighting
5. Adjustments may include but is not limited to:	• Valve clearances • Spark plug gaps • Exhaust emission settings • Wheel, steering and suspension alignment • Headlight alignment; • Drive belt tension; • Engine idling speed; • Lubricant and fluid levels; • Fuel pressure; • Brake clearances; • Tyre pressure. • Wheel balancing • Fluid level
6. Assessments may include but is not limited to:	• Damage; • Fluid leaks; • Air conditioning gas leaks;

Variable	Range
	• Wear and tear; • Security of parts and components; • Condition and serviceability; • Necessity for adjustment.
7. Vehicle service parts may include but is not limited to:	• Oil, fuel, air and diesel exhaust filters; • Wiper blades; • Spark plugs; • Brake pads/linings; • Drive belts; • Seals and gaskets. • Tyre fitting and puncture repair • Lining/pad • Fan belts
8. Tools and equipment may include but is not limited to:	• Spanners • Screw drivers • Pliers • Oil can • Grease gun • Jacks • Axle stands • Car hoist • Hammers
9. Approved format. may include but is not limited to:	• Manufacturers' maintenance schedules; • Company's maintenance schedules.
10. Agreed time frame may include but is not limited to:	• Manufacturers' recommended work times; • Job times set by the company; • Job time agreed with a specific customer.
11. Lubricants and fluids may include but is not limited to:	• Engine oil • Gear box oil • Automatic transmission oil (ATF) • Brake fluids • Coolants

REQUIRED SKILLS

- Communications (verbal and written);
- Trouble shooting
- Proficient in ICT;
- Time management;
- Problem solving;
- Decision making;

- Multitasking;
- First aid;
- Driving.
- Planning
- Writing

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
- Job card preparation
- Technical information
- Customer relation
- Diagnostic tools and equipment
- Rectification system defects
- Vehicle fluids and lubricants
- Vehicle systems and components
- Vehicle basic inspection
- Legal requirements relating to the vehicle maintenance activities for vehicle systems and components
- Kenyan legislation and workplace procedures relevant to:
- Recording vehicle maintenance work and any variations from the
- 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

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 Prepared job cards 1.6 Cleaned vehicle, tools, equipment and workshop/station 1.7 Disposed fluid and solid wastes
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; 2.6 Personal protection equipment and suitable coverings to protect vehicles.
3. Methods of Assessment.	*Competency may be assessed through:* 3.1 Observation 3.2 Oral questioning 3.3 Written test
4. Context of Assessment.	4.1 Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions or industrial attachment
5. Guidance information for assessment.	4.2 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

SERVICE AND REPAIR VEHICLE ENGINE COMPONENTS

UNIT CODE: ENG/OS/AUT/CR/2/5/A

Unit description:
This unit specifies competencies required to service and repair vehicle engine parts. It involves troubleshooting 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	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
1. Troubleshoot vehicle engine components	1.1 Personal protective equipment (PPE) are used as per OSHA 2007 1.2 Health, safety environment and quality regulations are observed as per OSH Act 2007 1.3 Engine is removed according to manufacturer's manual 1.4 ***Engine components*** are dismantled according to manufacturer's manual 1.5 Engine defective parts are replaced according to manufacturer's manual 1.6 Engine parts are serviced according to manufacturer's manual 1.7 Vehicle engine parts are reassembled according to manufacturer's manual 1.8 Engine is fit back into the vehicle according to manufacturer's manual 1.9 ***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 manual 2.2 Engine oil rings/ piston gudgeon pin are replaced according to manufacturer's manual 2.3 Timing belts/chains are replaced according to manufacturer's manual 2.4 Engine bearings are replaced according to manufacturer's manual 2.5 ***Engine pulleys*** are replaced according to manufacturer's specification

ELEMENT	PERFORMANCE CRITERIA *(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 manual 2.16 Engine tune up is performed according to manufacturer's specification
3. Service vehicle engine cooling system	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 manual 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 manual 3.8 cooling system is pressure tested according to manufacturer's specification 3.9 cooling system is bled according to manufacturer's specification 3.10 vehicle engine coolant is "read" according to manufacturer's specification

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
	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 manual 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
5. Service vehicle engine lubrication system	5.1 engine oil is drained and replaced according to manufacturer's manual 5.2 engine transmission and hydraulic filters are replaced according to manufacturer's specification 5.3 Heavy commercial/light vehicle components 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:	• bleeding • engine ignition timing • initialization
2. Engine components may include but is not limited to:	• Oil seals and oil filters • Piston and piston rings • Top covers • Valves, push rods and valve lifters • Camshaft • Crankshaft • Drive pulleys • Oil sump and oil pump

Variable	Range
	• Timing gears • Cylinder head • Cylinder block
3.Engine pulleys may include but is not limited to:	• Water pump • camshaft
4. Engine V-belts may include but is not limited to:	• Fan • power steering

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

REQUIRED KNOWLEDGE AND SKILLS

The individual needs to demonstrate knowledge of:

- Legislative and organizational requirements and procedures
- Kenyan legislation and workplace procedures relevant to:
- Legal requirements relating to the vehicles warranty and insurance policies
- Rectification procedures
- Obtaining the correct information for rectification
- 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.

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 Used Personal protective equipment (PPE)

	1.2 Observed Health, safety, environmental and quality regulations 1.3 Removed engine 1.4 Dismantled engine parts and checked 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 3.2 Oral questioning 3.3 Written tests
4. Context of Assessment.	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions on during industrial attachment
5. Guidance information for assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

SERVICE VEHICLE FUEL SYSTEM

UNIT CODE: ENG/OS/AUT/CR/3/5/A

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	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
1. Service fuel components e.g. carburettor, 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 1.5 Assemble back serviced components as per manufacturer's manual
2. Replace petrol fuel pump	2.1 **Petrol fuel pump** location is identified as per manufacturers manual 2.2 **Tools and Equipment** are used to remove and refit petrol fuel components as per manufacturers' manual 2.3 Petrol fuel pump is removed as per manufacturers manual 2.4 Petrol fuel pump is replaced/fitted as per manufacturers manual 2.5 Fuel system operation test is conducted as per manufacturers manual 2.6 Faulty fuel pump is disposed as per company policy and Health, Safety, environmental and quality
3. 3Replace 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. 3.5 Diesel system operation test is conducted as per manufacturer's manual

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
1. Service fuel components e.g. carburettor, 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 1.5 Assemble back serviced components as per manufacturer's manual
4. Perform injector pump timing	3.1 Fan belt and timing belt/chain cover are removed in accordance with the workshop manual 3.2 Timing marks are identified in accordance with manufacturers' manual 3.3 Timing marks are aligned and timing belt fitted as per manufacturers manual 3.4 Timing belt tensioner is adjusted and timing marks reconfirmed as per manufacturers manual 3.5 Timing cover and fan belt are fitted back as per manufacturers manual 3.6 Diesel system operation test is performed as per manufacturers manual
5. Test fuel injectors for injection pressure and voltage	5.1 Identify the ***diagnostic equipment*** for testing according manufacturer's specification. 5.2 Tools and equipment are identified according to manufacturer's manual. 5.3 Connect the gauges according to manufacturer's manual 5.4 Take the ***measurements*** according to manufacturer's specification. 5.5 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:	• Specialist tools relevant to specific vehicle makes and models; • General workshop equipment; • Electrical multi-meter • Fuel system pressure gauge • Faulty code diagoniser

Variable	Range
	• Prepared and shared vehicle fuel system service report
2. Petrol fuel pump may include but is not limited to:	• Mechanical • Electrical
3. Components may include but is not limited to:	• Fuel pump • Fuel filter • Fuel tank • Fuel high pressure pump • Fuel pipes • Fuel feed pump • Injectors • Fuel level gauge • Fuel sensors
4. Manufacturer's procedure may include but is not limited to:	• Vehicle technical data • Manufacturers' tolerances and specification data. • Manufacturers' specifications • Approved company practices
5. Diagnostic equipment may include but is not limited to:	• Pressure gauge • Multi meter gauge
6. Measurements may include but is not limited to:	• Injection pressure • Injection voltage
7. Standard operating procedures (SOP) may include but is not limited to:	• Company policy • Filling system • Record management procedures • Client satisfaction procedures.

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

- Team player
- Listening

Required knowledge

The individual needs to demonstrate knowledge of:

- Handling fuel in line with health safety environmental and quality precautions (environment include waste disposal)
- Interpretation of symbols on the manufacturers manual
- Fuel system
- Legislative and organisational requirements and procedures
- Kenyan legislation and workplace procedures relevant to:
- Appropriate personal and vehicle protective equipment.
- Documenting assessment and rectification information.
- Reporting

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; 1.5Tested/checked fuel system for satisfactory operation as per the manufacturer's 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 3.2 Oral questioning 3.3 Written test
4. Context of Assessment.	Competency may be assessed individually in an actual workplace or in work-simulated conditions within

	accredited institutions or during industrial attachment
5. Guidance information for assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

SERVICE VEHICLE TRANSMISSION SYSTEMS

UNIT CODE: ENG/OS/AUT/CR/4/5/A

Unit description:
This unit specifies competencies required to service vehicle transmission system.
It involves organize to service vehicle transmission systems,Troubleshoot vehicle transmission system ,overhaul gearbox unit (manual), overhaul gearbox semi/automatic, carry out hydraulic/tiptronic test and measurement.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA *(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` 1.2 Interpret the job card 1.3 ***Tools and equipment*** and materials are availed as per manufacturers recommendation
2. Troubleshoot vehicle transmission system	2.1 Visual inspection of the vehicle is done 2.2 Technical inspection is done while engine is running according to manufacturer's specifications. 2.3 Vehicle is inspected underneath 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.

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
	3.10 Refill gearbox oil to the recommended level according to 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 specification.
5. Carry out hydraulic/tiptronic system tests and measurements	5.3 Identify tools and equipment according to manufacturer's specifications. 5.4 Perform stall test according to manufacturer's manual 5.5 Perform pressure test according to manufacturer's specifications. 5.6 Perform shift test according to manufacturer's specifications. 5.7 Perform tiptronic diagnosis test using fault diagnostic gadget according to manufacturer's manual. 5.8 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:	• Bearings • Gears • Synchromesh unit • Gearbox shafts and thrust plates

Variable	Range
	• Gear selectors, sensors and linkages • Constant velocity and universal joints • Clutch assemblies release bearings • Automatic gearbox pump and oil strainer • Transmission unit mounting • Flywheel • Transmission drive shaft/half shaft • propeller shaft/center rubber
2. Manual gearbox components may include but is not limited to:	• Input shaft • Lay shaft • Output shaft • Speed gearwheels • Synchronizer unit • Selector shafts/forks
2. Semi/automatic gearbox components may include but is not limited to:	• Fluid flywheel • Torque convertor • Shift valve • Brake bands • Front clutch • Rear clutch • Sun wheel gears • Planetary gears • Carrier gear • Output shaft

REQUIRED KNOWLEDGE AND SKILL

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

Required knowledge

The individual needs to demonstrate knowledge of:

- Operation of transmission systems
- Measuring, assessing the condition of components
- Recognized assessment and rectification
- Procedures and obtaining the correct information for rectification
- Documenting assessment and rectification information
- The relationship between time, costs and profitability
- Technical information for Transmission of servicing activities
- Reporting anticipated delays to relevant person(s)
- Purpose of, and how to use identification codes
- Operation of transmission systems
- Gaskets, sealants, seals, fittings and fasteners
- Test and evaluate the performance of replacement transmission System units and components

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 3.2 Oral questioning 3.3 Written tests
4	Context of Assessment.	Competency may be assessed individually in an actual workplace or in work-simulated conditions within Accredited institutions or during industrial attachment
5	Guidance information for assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

SERVICE VEHICLE STEERING SYSTEM

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

Unit description:
This unit specifies competencies required to service vehicle steering system. It involves assess vehicle steering system, remove steering components, assess serviceability of vehicle, replace/service vehicle steering, fit and test vehicle steering components and document vehicle steering system service

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA *(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 2.2 Vehicle is raised in accordance with workshop procedures 2.2 ***Lubricants and fluids*** are drained and disposed according to HSE&Q 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
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

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
	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	4.1 Steering components are fitted back as per service manual 4.2 Lubricants and fluids are replenished according to the service manual 4.3***Steering geometry*** is set in accordance with manufacturers' specifications 4.4 Steering system is tested as per the manufacturers specification
6. Finalize vehicle steering system service	5.1. Steering service and repair is completed according to workplace policy/customer's specification 5.2 workshop/station is cleaned in accordance with work shop procedures 5.3 **Waste** is disposed as per OSH Act- 2007

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:	• Steering rack • Tie rods; • Steering box • Steering column • Universal joint/coupling • Drop arm • Dust rubber boot • Steering wheel

Variable	Range
2. Assessment methods may include but is not limited to:	• Visual • Measurement • Acoustic • Vibration • Functional • Serviceable • Unserviceable • Tolerances
3. Steering geometry / wheel alignment may include but is not limited to:	• Toe in / Toe out • Castor • Camber • Kingpin inclination
• Service and repair records may include but is not limited to:	• Job cards • Company IT system • Customer database
4. Job card may include but is not limited to:	• Date • Job card number • Customer order number • Customers name • Vehicle registration • Tasks/repairs/services to be performed • Person assigned the work • Supervisor authorization
5. Wastes may include but is not limited to:	• Liquid • Solid/Rubber
6. Agreed timeframe may include but is not limited to:	• Manufacturers' recommended work times • Job times set by the company • Job time agreed with a specific customer

Commented [RG1]:

REQUIRED KNOWLEDGE AND UNDERSTANDING

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

Required knowledge

The individual needs to demonstrate knowledge of:

- Kenyan legislation and workplace procedures
- reporting
- sources of technical information
- 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,
- The principles of suspension and steering geometry

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 1.5 Repaired/serviced, replaced and restored components as per manufacturer's specification 1.6 Reassembled steering components in accordance with manufacturers' specifications 1.7 Completed steering system servicing within set time frame 1.8 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:*** 5.1 Observation 5.2 Oral questioning 5.3 Written test
4. Context of Assessment	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions or during industrial attachment.
5. Guidance informationfor assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

SERVICE VEHICLE SUSPENSION SYSTEM

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

Unit description:

This unit specifies competencies required to service vehicle suspension system. It involves assess vehicle suspension components, remove vehicle suspension system components, assess vehicle suspension component serviceability and replace/service vehicle system It also involves fitting and testing vehicle suspension components and documenting vehicle suspension service.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
1. Assess vehicle suspension system	1.1 Work area and suspension 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 filled 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 workshop procedures 2. 3Suspension 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 service job card 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

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
	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 suspension components	5.1 Suspension components are fitted back as per service manual 5.2 ***Suspension alignment*** is set in accordance with manufacturers' specifications 5.3 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 6.3 Suspension ***service and job card*** is 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 limited to:	• Wishbone/arms • Shock absorbers/dampers • Strut • Torsion bar • Stabilizer • Coil/leaf/rubber spring
2. Assessment methods may include but is not limited to:	• Visual • Measurement • Acoustic • Vibration • Functional • Serviceable • Unserviceable • Tolerances

Variable	Range
3. Suspension alignments may include but is not limited to:	• Wheel base • Wheel track
4. Service and repair records may include but is not limited to:	• Job cards • Company IT system • Customer database
5. Agreed timeframe may include but is not limited to:	• Manufacturers' recommended work times • Job times set by the company • Job time agreed with a specific customer

REQUIRED KNOWLEDGE AND SKILLS

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

Required knowledge

The individual needs to demonstrate knowledge of:

- Legal requirements relating to the vehicle and its construction
- Reporting delays to the completion of work
- sources of technical information
- Construction and operation of suspension and steering systems
- The construction, layout and operation of different types of suspension 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
- The principles of suspension and steering geometry

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 1.5 Repaired/serviced, replaced and restored suspension components as per manufacturer's specification 1.6 Reassembled suspension components in accordance with manufacturers' specifications 1.7 Completed suspension system servicing within set time frame 1.8 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:*** 1.1 Observation 1.2 Oral questioning 1.3 Written test
4. Context of Assessment	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions or during industrial attachment
5. Guidance information for assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

SERVICE VEHICLE BRAKING SYSTEM

UNIT CODE: ENG/OS/AUT/CR/7/5/A

UNIT DESCRIPTION:

This unit specifies competencies required to service motor vehicle braking system. It involves, assess vehicle braking system,dismantle wheel brake assembly parts ,assess braking components,replace wheel brake assembly parts,replace brake cylinders and service brake system

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	**PERFORMANCE CRITERIA** ***(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** performance is verified 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 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 replaceable 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

ELEMENT	PERFORMANCE CRITERIA ***(Bold and italicized terms are elaborated in the Range)***
	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 wheel cylinder is replaced/serviced as per the manufacturer's specifications 5.3 Brake booster is serviced as per the manufacturer's manual
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 serviced 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 6.7 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:	• Servo unit (booster) • Master cylinder • Calipers • Disc (rotor) • Drum • Brake pads and linings • Wheel cylinders • Brake adjusters • Actuators

Variable	Range
	• ABS unit • Flexible pipes • Parking brake cable.
2. Assessment.	Corrosion • Seizure • Serviceable • Unserviceable • Within or outside tolerances • Necessitates adjustment
3. Records.	• Job cards • Company IT system • Customer database
4. Agreed timescale.	• Manufacturers' recommended work times • Job times set by the company • Job time agreed with a specific customer

REQUIRED SKILLS AND KNOWLEDGE

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

Required knowledge

The individual needs to demonstrate knowledge of:

- Legislative and organizational requirements and procedures
- Workplace procedures for:
- assessment and rectification procedures
- Operation of brake systems
- Brake units and components removal and replacement
- selection and use of sealants, seals, fittings and fasteners
- testing and evaluation brake system units
- Operating specifications and any legal requirements

- Appropriate test methods

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 of 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 1.7 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 3.2 Oral questioning 3.3 Written Test
4. Context of Assessment.	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions and during Industrial Attachment.
5.Guidance information for assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

SERVICE VEHICLE ELECTRICAL SYSTEMS

UNIT CODE: ENG/OS/AUT/CR/8/5/A

UNIT DESCRIPTION:

This unit specifies competencies required to service vehicle electrical system. It involves, diagnosis electrical system, service vehicle ignition system, electrical accessories, service vehicle air conditioning, service vehicle charging systems,service vehicle auxiliary systems,service vehicle lighting system,service vehicle electrical motors and install vehicle safety systems

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA ***(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 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

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
	3.5 Accessories are tested for correct operation as per manufacturer's 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 auxiliary systems	6.1 Vehicle alarms and horns are 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 manufacturer's specifications.

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
	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 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 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 Fit 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:	• General workshop equipped for servicing vehicle electrical systems; • Electronic diagnostic equipment; • Multi-meters; • Ignition test equipment. • Hydrometer • High rate discharge tester • Feeler gauge

Variable	Range
2. auxiliary systems may include but is not limited to:	• Radio • Car track • Camera • Spot lights • Spoilers • Interior lightings
3. Service Manual may include but is not limited to:	• Instructions provided by the manufacturer on how to remove, disassemble, repair and refit components
4. Condition and functionality may include but is not limited to:	• Specific gravity/hydrometer test • High rate discharge test
5. Technical information may include but is not limited to:	• Vehicle technical data; • Manufacturers' online information; • On-board diagnostics (OBD) displays; • Accessory manufacturers technical data
6. Electrical systems may include but is not limited to:	• Starting system including motors and battery terminals; • Charging system including alternators; • Ignition system components including steering lock switches; • Audio systems including speakers; • Electrical wiring; • Lighting system including bulbs and sockets; • Electrical and electronic sensors; • Auxiliary motors including wipers, heater blowers, and window actuators.
7. Gauge may include but is not limited to:	• Speedometer • Temperature gauge • Fuel level gauge • Oil pressure gauge
8. Electrical motors may include but is not limited to:	• Starter motor • Wiper motor • Window motor

Variable	Range
9. Aftermarket accessories. may include but is not limited to:	• GPS systems; • Cameras; • Radios and speakers; • Auxiliary lights;
10. . Headlights may include but is not limited to:	• Sealed beam • Non-sealed beam
11. Flasher unit may include but is not limited to:	• Hazard warning • Electronic type

REQUIRED KNOWLEDGE AND SKILLS

Required knowledge

The individual needs to demonstrate knowledge of:

- Legislative and organizational requirements and procedures
- Workplace procedures for:
- assessment and rectification procedures
- The importance of documenting assessment and rectification information.
- Reporting
- use of identification codes
- Vehicle earthling principles and earthling methods
- Electrical and electronic principles
- Types of circuit protection and why these are necessary.
- Electrical safety procedures electric symbols, units and terms
- Electrical and electronic control system principles
- hazards associated with *high energy electrical component*.
- brake systems
- selection and use of sealants, seals, fittings and fasteners
- Operating specifications and any legal requirements
- appropriate test methods
- Electrical principles

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

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
2. Resource Implications	The following resources must be provided: 2.1 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 3.2 Oral questioning 3.3 Written Test
4. Context of Assessment	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions or during Industrial Attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

PERFORM VEHICLE BODY WORKS

UNIT CODE: ENG/OS/AUT/CR/9/5/A

Unit description:
This unit specifies the competencies required to perform vehicle body works. It involves use body work tools and equipment, perform vehicle body jacking, perform vehicle body pulling ,perform vehicle body dent checking, beating and gas welding ,perform vehicle body filing and sanding ,apply spot putty ,perform vehicle body cleaning/degreasing ,spray and valet vehicle body,perform vehicle body fitting and perform vehicle body buffing ispose vehicle body scrap/dead stock

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
1. Use body work tools and equipment	1.1 Identify and use PPE as per workshop regulations 1.2 Identify and set out vehicle body works tools and equipment as per workshop procedures 1.3 Use vehicle body work tools and equipment to perform vehicle body works as per work shop procedures
2. Perform vehicle body jacking	2.1 Body panel section requiring body jacking is identified according to workshop procedures. 2.2 Position body jack on the vehicle panel section according to workshop procedures. 2.3 Body jack is operated according to manufacturer's specification.
3. Perform vehicle body pulling	3.1 Body panel section requiring body pulling is identified according to workshop procedures. 3.2 Position body hook puller on the vehicle panel section according to workshop procedures. 3.3 Body hook puller is operated according to manufacturer's specification
4. Perform vehicle body dent checking, beating and gas welding	4.1 Vehicle body dent section is identified according to workshop procedures. 4.2 ***Dent removal tool*** is operated according to workshop procedures. 4.3 Body panel section requiring body beating is identified according to workshop procedures. 4.4 Operate ***panel beating tools*** on the vehicle panel section according to workshop procedures.

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
	4.5 Gas welding equipment is operated to heat panel section according to workshop procedures.
5. Perform vehicle body filing and sanding	5.1 Body filler material is applied on the panel section as per workshop procedures. 5.2 Tools and equipment are identified according to workshop procedures. 5.3 Body sanding is performed on the panel section as per workshop procedures.
6. Apply spot putty	6.1 Panel section to apply spot putty is identified according to workshop procedures. 6.2 Spot putty is applied according to workshop procedures. 6.3 Dry sanding is performed according to workshop procedures
7. Perform vehicle body cleaning/degreasing	7.1 Necessary cleaning materials are identified according to cleaning procedures. 7.2 Wet sanding procedure is performed according to workshop process. 7.3 Drying process is performed according to workshop procedures.
8. Spray and valet vehicle body.	8.1 Vehicle parts not requiring painting are masked according to workshop procedures. 8.2 Automotive paints are identified according to manufacturer's specification. 8.3 Primer is sprayed according to workshop procedures. 8.4 Appropriate colour matching and mixing (manual/computer aided) is performed according to manufacturer's specification. 8.5 Spraying equipment is selected according to manufacturer's specifications. 8.6 First coat paint is sprayed according to workshop procedures. 8.7 Second coat paint is sprayed according to workshop procedures. 8.8 Body valeting is performed according to workshop procedures. 8.9 Final coat paint is sprayed according to workshop procedures. 8.10 Vehicle paint is cured/ baked according to manufacturer's specifications.

ELEMENT	PERFORMANCE CRITERIA *(Bold and italicized terms are elaborated in the Range)*
9. Perform vehicle body fitting	9.1 Upholstery items are identified according to workshop procedures. 9.2 Tools and equipment are identified according to workshop procedures. 9.3 Upholstery items are checked/ serviced according to workshop procedures. 9.4 Upholstery items are fitted according to manufacturer's specifications.
10. Perform vehicle body buffing	10.1 Buffing tools and materials are selected according to manufacturer's specifications. 10.2 Vehicle body is prepared for buffing according to workshop procedures. 10.3 Body buffing is performed according to manufacturer's specifications 10.4 Body vehicle cleaning is performed.
11. Dispose vehicle body scrap/dead stock	11.1 Dispose scrap/dead stock as per the workshop regulations 11.2 Vehicle body scrap/dead stock records are updated as per the workshop 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. Dent removal tool may include but is not limited to	• Dollies • Spoons
2. Panel beating tools may include but is not limited to	• 2.1 Ve Dinging hammer • Chipping hammer • soft hammer • Lever
3. Body filler material may include but is not limited to	• Compound filler • Hardener • Chemical paste

Variable	Range :
4. Cleaning materials may include but is not limited to	• Chemical compounds • Rubbing compounds • Solvents
5. . spraying equipmen may include but is not limited to t	• Compressor • Spraying gun • Compressor hose

REQUIRED KNOWLEDGE AND SKLLS

Required knowledge

The individual needs to demonstrate knowledge of:

- Legislative and organizational requirements and procedures
- Workplace procedures for:
- Use of technical information
- Vehicle body works principles
- Design and construction of vehicle body.
- The functions of vehicle body components
- How to service vehicle body
- How to use vehicle body workshop tools
- How to` mix and match automotive color paints
- legal requirements concerned with the disposal of body shop wastes

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

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

EVIDENCE GUIDE

1. Critical Aspects of Competency.	***Assessment requires evidence that the candidate:*** 1.1 Worked in a safe and clean environment using appropriate PPEs 1.2 Identified and used vehicle body works tools and equipment 1.3 Performed vehicle body jacking 1.4 Pulled vehicle body 1.5 Checked and identified vehicle body dents 1.6 Performed vehicle body beating and gas welding 1.7 Applied spot putty 1.8 Performed vehicle body spraying 1.9 Performed vehicle body valeting and buffing
2. Resource Implications	The following resources should be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate Tools & equipment 2.3 Materials relevant to the activity
3. Methods of Assessment.	***Competency may be assessed through:*** 3.1 Practical Test 3.2 Oral questioning 3.3 Written Test
4. Context of Assessment.	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions or during industrial attachment.
5. Guidance information for assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.