TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)

COMPETENCY BASED CURRICULUM

FOR

AUTOMOTIVE TECHNOLOGY

LEVEL 4

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 to the formulation of the Policy Framework for Reforming Education and Training. 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 Occupational Standards Curriculum were developed for the purpose of developing a Competency-Based Curriculum for Automotive Technology Level 4. These Occupational Standards will also be the bases for assessment of an individual for competence certification.

It is my conviction that this Curriculum will play a great role towards development of competent human resource for the Automotive 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, 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 labour force.

The TVET Curriculum Development, Assessment and Certification Council (TVET CDACC), in conjunction with Automotive Sector Skills Advisory Committee (SSAC) have developed Occupational Standards for Automotive Artisan Level 4. These standards will be the bases for development of Competency Based Curriculum for Automotive Technology Level 4.

This Curriculum has been developed following the CBET framework policy; the CBETA standards and guidelines provided by the TVET Authority and the Kenya National Qualification Framework designed by the Kenya National Qualification Authority..

I am grateful to the Council Members, Council Secretariat, Automotive SSAC, expert workers and all those who participated in the development of these Curriculum.

CHAIRPERSON, TVET CDACC

ACKNOWLEDGMENT

This Curriculum was 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.

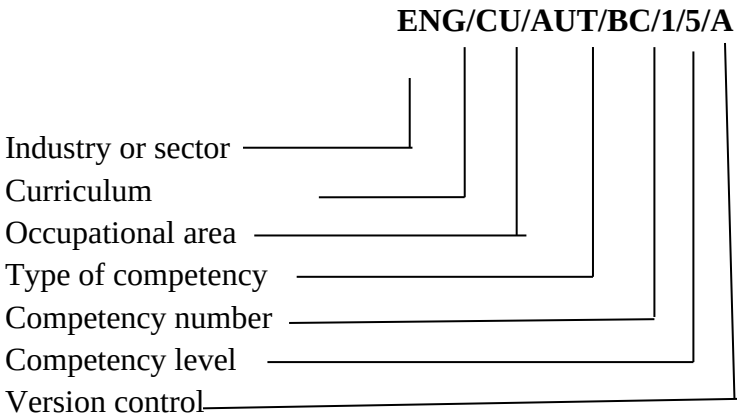
COUNCIL SECRETARY/CEO

TVET CDACC

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
KCSE	Kenya Certificate of Secondary Education
KNQA	Kenya National Qualification Authority
KNQF	Kenya National Qualification Framework
KPI	King Pin inclination
OBD	On-board diagnostics
PPE	Personal protective equipment
SI	Spark ignition
TVET	Technical and Vocational Education and Training
TXV	Thermal expansion valve
UJ	Universal joint

KEY TO UNIT CODE



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COURSE OVERVIEW

1. Brief description of the course

This course is designed to equip individuals with the competences required to practice as Automotive Artisans in the modern Kenyan motor vehicle service and repair. It reflects the employers' demand for qualified personnel, that would enable them to compete in an environment where the technical sophistication of vehicles is constantly evolving, and the expectations of clients are becoming ever more demanding.

The course consists of a programme of:

Basic units of learning to build the necessary skills and attitudes to enhance the employability of automotive Artisans, enabling them to make positive contributions to the operations and profitability of modern vehicle service and repair organisations;

Core units of learning to develop high-end knowledge and skills to service and repair vehicles and their systems, including engines, engine auxiliary systems, transmission, suspension, steering, brakes, electrical systems, and air conditioning.

2. Units of Learning

Basic Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit factors
ENG/CU/AUT/BC/1/4/A	Communication Skills	20	2
ENG/CU/AUT/BC/2/4/A	Digital Literacy	35	3.5
ENG/CU/AUT/BC/3/4/A	Entrepreneurial Skills	60	6
ENG/CU/AUT/BC/4/4/A	Employability Skills	30	3

ENG/CU/AUT/BC/5/4/A	Environmental Literacy	20	2
ENG/CU/AUT/BC/6/4/A	Occupational Safety and Health Practices	20	2
Total		**210**	**21**

Common Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit Factors
ENG/CU/AUT/CC/1/4/A	Goemetry Drawing	50	5
ENG/CU/AUT/CC/2/4/A	Basic Mathematics	50	5
ENG/CU/AUT/CC/3/4/A	Basic Science Principles	50	5
ENG/CU/AUT/CC/4/4/A	Workshop Technology Applications	50	5
ENG/CU/AUT/CC/5/4/A	Maintaining Workshop Tools, Equipment and Measuring Devices	20	2
Total		**220**	**22**

Core Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit factors

ENG/CU/AUT/CR/1/4/A	Vehicle Basic Maintenance	50	5
ENG/CU/AUT/CR/2/4/A	Servicing and Repairing Vehicle Engines.	70	7
ENG/CU/AUT/CR/3/4/A	Servicing and Repairing Vehicle Fuel Systems.	40	4
ENG/CU/AUT/CR/4/4/A	Servicing Vehicle Steering and Suspension Systems.	60	6
ENG/CU/AUT/CR/5/4/A	Servicing Vehicle Braking Systems.	60	6
ENG/CU/AUT/CR/6/4/A	Servicing Vehicle Electrical Systems.	70	7
	Industrial attachment	300	30
Total		**650**	**65**
Grand total		**1060**	**106**

3. Entry Requirements

An individual entering this course should have any of the following minimum requirements:

i). Kenya Certificate of Secondary Education (K.C.S.E.) with a minimum mean grade of E

Or

ii). Automotive Engineering Artisan Level 3 certificate with **one** year of continuous work experience

Or

iii). Equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA)

4. Trainer qualification

A trainer for this course should have a higher qualification than the level of this course

5. . Provision for Industrial attachment

It is envisaged that the trainee will have undergone an industrial training and assessment with a recognised motor vehicle service garage as a prerequisite for completion of this training course.

6. Assessment

The course will be assessed at two levels: internally and externally. Internal assessment is continuous and is conducted by the trainer who is monitored by an internal accredited verifier while external assessment is the responsibility of TVET CDACC.

As part of the continuous internal assessment process, trainees will maintain a portfolio of evidence of their achievements.

7. Certification

On successful completion of a Unit of Learning, a trainee will be issued with a Certificate of Competency that acknowledges the achievement of that competence. On successful completion of **all** units of learning, a trainee will be awarded an Automotive Artisan Certificate qualification. These certificates will be issued by TVET CDACC in conjunction with training provider.

BASIC UNITS OF LEARNING

COMMUNICATION SKILLS

UNIT CODE:ENG/CU/AUT/BC/1/4/A

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate Communication Skills

Duration of Unit: 20 Hours

Unit Description
This unit covers the competencies required demonstrate communication skills. It involves obtaining and conveying workplace information, completing relevant work-related documents, communicating information about workplace processes, leading workplace discussion and communicating workplace issues.

Summary of Learning Outcomes

1. Obtain and convey workplace information
2. Complete relevant work-related documents
3. Communicate information about workplace processes
4. Lead workplace discussions
5. Identify and communicate issues arising in the workplace

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Obtain and convey workplace information	• Communication process • Modes of communication • Medium of communication • Effective communication • Barriers to communication • Flow of communication • Sources of information • Types of questions • Organizational policies • Workplace etiquette • Ethical work practices in handling communication	• Interview • Third party reports

2. Complete relevant work-related documents	• Types and purposes of workplace documents and forms • Methods used in filling forms and documents • Recording workplace data • Process of distributing workplace forms and documents • Report writing • Types of workplace reports	• Interview • Third party reports
3. Communicate information about workplace processes	• Communication process • Modes of communication • Medium of communication • Effective communication • Barriers to communication • Flow of communication • Sources of information • Organizational policies • Organization requirements for written and electronic communication methods • Report writing • Effective questioning techniques (clarifying and probing) • Workplace etiquette • Ethical work practices in handling communication	• Interview • Portfolio
4. Lead workplace discussion	• Methods of discussion e.g. ✓ Coordination meetings ✓ Toolbox discussion ✓ Peer-to-peer discussion • Solicitation of response	• Interview • Third party reports
5. Identify and communicate issues arising in the workplace	• Identification of problems and issues • Organizing information on problems and issues • Relating problems and issues • Communication barriers affecting workplace discussions	• Interview • Portfolio

Suggested Methods of Instructions

- Direct instruction
- Demonstration
- Practice assignment
- Discussion
- Role play
- Brainstorming

Recommended Resources

- Desktop computers/laptops
- Internet connection
- Projectors
- Telephone
- Report writing templates

DIGITAL LITERACY

UNIT CODE:ENG/CU/AUT/BC/2/4/A

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate Digital Literacy

Duration of Unit: 35 hours

Unit Description
This unit covers the competencies required to demonstrate digital literacy in a working environment. It entails identifying computer software and hardware, applying security measures to data, hardware, software, applying computer software in solving task sand applying internet and email in communication at workplace.

Summary of Learning Outcomes
1. Identify computer software and hardware
2. Apply security measures to data, hardware and software
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify computer hardware and software	• Meaning of a computer • Functions of a computer • Components of a computer • Classification of computers	• Written tests • Oral • Observation
2. Apply security measures to data, hardware and software	• Data security and control • Security threats and control measures • Types of computer crimes • Detection and protection against computer crimes	• Written tests • Oral presentation • Observation • Projects
3. Apply computer software in solving tasks	• Operating system • Word processing • Spread sheets • Data base	• Oral questioning • Observation • Project

4. Apply internet and email in communication at workplace	• Computer networks • Uses of internet • Electronic mail (e-mail) concept	• Oral questioning • Observation • Oral presentation • Written report

Suggested Methods of Instructions

- Instructor led facilitation of theory
- Demonstration by trainer
- Practical assignment
- Viewing of related videos
- Project
- Group discussions

Recommended Resources

- Desktop computers
- Laptop computers
- Other digital devices
- Printers
- Storage devices
- Internet access
- Computer software

ENTREPRENEURIAL SKILLS

UNIT CODE: ENG/CU/AUT/BC/3/4/A

Relationship to occupational standards
This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

Duration of unit: 60 hours

Unit description
This unit covers the competencies required for creating and maintaining small scale business, establishing small business customer base, managing and growing a micro/small-scale business.

Summary of Learning Outcomes

1. Create and maintain small scale business
2. Establish small scale business customer base
3. Manage small scale business
4. Grow/expand small scale business

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Create and maintain small scale business	• Starting a small business • Legal regulatory requirements in starting a small business • SWOT/ PESTEL analysis • Conducting market/industry survey • Generation and evaluation of business ideas • Matching competencies with business opportunities • Forms of business ownership • Location of a small business • Legal and regulatory requirement • Resources required to start a small business • Common terminologies in entrepreneurship	• Individual/group assignments • projects • Written • Oral

	• Entrepreneurship in national development • Self-employment • Formal and informal employment • Entrepreneurial culture • Myths associated with entrepreneurship • Types, characteristics, qualities & role of entrepreneurs • History, development and importance of entrepreneurship • Theories of entrepreneurship • Quality assurance for small businesses • Policies and procedures on occupational safety and health and environmental concerns	
2. Establish small scale business customer base	• Good staff/workers and customer relations • Marketing strategy • Identifying and maintain new customers and markets • Product/ service promotions • Products / services diversification • SWOT / PESTEL analysis • Conducting a business survey • Generating Business ideas • Business opportunities	• Individual/group assignments • projects • Written • Oral
3. Manage small scale business	• Organization of a small business • Small business' business plan • Marketing for small businesses • Managing finances for small business	• Oral • Individual/group assignments • projects • Written

	• Production/ operation process for goods/services • Small business records management • Book keeping and auditing for small businesses • Business support services • Small business resources mobilization and utilization • Basic business social responsibility • Management of small business • Word processing concepts in small business management • Computer application software • Monitoring and controlling business operations	
4. Grow/expand small scale business	• Methods of growing small business • Resources for growing small business • Small business growth plan • Computer software in business development • ICT and business growth	• Individual/group assignments • projects • Written

Suggested Methods of Instructions

- Instructor led facilitation of theory
- Demonstration by trainer
- Practice by trainee
- Role play
- Case study

Recommended Resources

- Case studies for small businesses
- Business plan templates
- Lap top/ desk top computer

- Internet
- Telephone
- Writing materials

EMPLOYABILITY SKILLS

UNIT CODE: ENG/CU/AUT/BC/4/4/A

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate Employability Skills

Duration of Unit: 30 hours

Unit Description
This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating critical safe work habits, demonstrating workplace learning and workplace ethics.

Summary of Learning Outcomes

1. Conduct self-management
2. Demonstrate critical safe work habits
3. Demonstrate workplace learning
4. Demonstrate workplace ethics

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Conduct self-management	• Self-awareness • Formulating personal vision, mission and goals • Strategies for overcoming life challenges • Emotional intelligence • Assertiveness • Expressing personal thoughts, feelings and beliefs • Developing and maintaining high self-esteem • Developing and maintaining positive self-image • Articulating ideas and aspirations • Accountability and responsibility	• Written tests • Oral questioning • Portfolio of evidence • Third party report

	• Good work habits • Self-awareness • Self-development • Financial literacy • Healthy lifestyle practices	
2. Demonstrate critical safe work habits	• Stress and stress management • Punctuality and time consciousness • Interpersonal communication • Sharing information • Leisure • Integrating personal objectives into organizational objectives • Resources utilization • Setting work priorities • HIV and AIDS • Drug and substance abuse • Handling emerging issues	• Written tests • Oral questioning • Portfolio of evidence • Third party report
3. Demonstrate workplace learning	• Personal training needs identification and assessment • Managing own learning • Contributing to the learning community at the workplace • Cultural aspects of work • Variety of learning context • Application of learning • Safe use of technology • Identifying opportunities • Workplace innovation • Performance improvement • Handling emerging issues • Future trends and concerns in learning	• Written tests • Oral questioning • Portfolio of evidence • Third party report
4. Demonstrate workplace ethics	• Meaning of ethics • Ethical perspectives • Principles of ethics • Values and beliefs • Ethical standards • Organization code of ethics	• Written tests • Oral questioning • Portfolio of evidence • Third party report

	• Common ethical dilemmas • Organization culture • Corruption, bribery and conflict of interest • Privacy and data protection • Diversity, harassment and mutual respect • Financial responsibility/accountability • Etiquette • Personal and professional integrity • Commitment to jurisdictional laws • Emerging issues in ethics	

Suggested Methods of Instructions

- Simulation/Role play
- Group Discussion
- Presentations
- Q&A
- Case studies
- Assignments

Recommended Resources

- Computers
- Stationery
- Charts
- Video clips
- Audio tapes
- Radio sets
- TV sets
- LCD projectors

ENVIRONMENTAL LITERACY

UNIT CODE:ENG/CU/AUT/BC/5/4/A

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

Duration of Unit: 20 hours

Unit Description
This unit specifies the competencies required to demonstrate environmental literacy. It involves controlling environmental hazard, controlling environmental pollution, demonstrating sustainable resource use and evaluating current practices in relation to resource usage.

Summary of Learning Outcomes
1. Control environmental hazard
2. Control environmental pollution
3. Demonstrate sustainable use of resources
4. Evaluate current practices in relation to resource usage

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Control environmental hazard	• Purposes and content of Environmental Management and Coordination Act 1999 • Purposes and content of Solid Waste Act • Storage methods for environmentally hazardous materials • Disposal methods of hazardous wastes • Types and uses of PPE in line with environmental regulations • Occupational Safety and Health Standards (OSHS)	• Written tests • Oral questions • Observation of work procedures

2. Control environmental Pollution	• Types of pollution • Environmental pollution control measures • Types of solid wastes • Procedures for solid waste management • Different types of noise pollution • Methods for minimizing noise pollution	• Written tests • Oral questions • Observation of work procedures • Role play
3. Demonstrate sustainable resource use	• Types of resources • Techniques in measuring current usage of resources • Calculating current usage of resources • Methods for minimizing wastage • Waste management procedures • Principles of 3Rs (Reduce, Reuse, Recycle) • Methods for economizing or reducing resource consumption	• Written tests • Oral questions • Observation of work procedures
4. Evaluate current practices in relation to resource usage	• Collection of information on environmental and resource efficiency systems and procedures, • Measurement and recording of current resource usage • Analysis and recording of current purchasing strategies. • Analysis of current work processes to access information and data • Identification of areas for improvement	• Written tests • Oral questions • Observation of work procedures
5. Identify Environmental legislations/conventions for environmental concerns	• Environmental issues/concerns • Environmental legislations /conventions and local ordinances • Industrial standard /environmental practices • International Environmental Protocols (Montreal, Kyoto)	• Written tests • Oral questions • Observation of work procedures

	• Features of an environmental strategy	

Suggested Methods of Instructions

- Instructor led facilitation of theory
- Practical demonstration of tasks by trainer
- Practice by trainees/ role play
- Discussion
- Observations and comments and corrections by trainers

Recommended Resources

- Computers
- Stationery
- Charts
- Video clips
- Audio tapes
- Radio sets
- TV sets
- LCD projectors
- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE)

OCCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE:ENG/CU/AUT/BC/6/4/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstrate Occupational Safety and Health Practices

Duration of Unit: 20 hours

Unit Description

This unit specifies the competencies required to practice safety and health and comply with OSH requirements relevant to work. It involves adhering to workplace procedures for hazards and risk prevention and participating in arrangements for workplace safety and health maintenance.

Summary of Learning Outcomes

1. Adhere to workplace procedures for hazards and risk prevention
2. Participate in arrangements for workplace safety and health maintenance

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Adhere to workplace procedures for hazards and risk prevention	• Arrangement of work area and items in accordance with Company housekeeping procedures • Adherence to work standards and procedures • Application of preventive and control measures, including use of safety gears/PPE • Study and apply standards and procedures for incidents and emergencies.	• Oral questions • Written tests • Portfolio of evidence • Third party report
2. Participate in arrangements for workplace safety and health maintenance	• Participating in orientations on OSH requirements/regulations of tasks • Providing feedback on health, safety, and security concerns to appropriate personnel as required in a sufficiently detailed manner	• Oral questions • Written tests • Portfolio of evidence • Third party report

	• Practice workplace procedures for reporting hazards, incidents, injuries and sickness • OSH requirements/ regulations and workplace safety and hazard control procedures are reviewed, and compliance reported to appropriate personnel • Identification of needed OSH-related trainings are proposed to appropriate personnel	

Suggested Methods of Instructions

- Assigments
- Discussion
- Q&A
- Role play
- Viewing of related videos

Recommended Resources

- Computers
- Stationery
- Charts
- Video clips
- Audio tapes
- Radio sets
- TV sets
- LCD projectors
- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE) e.g.
    - Mask
    - Face mask/shield
    - Safety bootsn
    - Safety harness
    - 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

COMMON UNITS OF LEARNING

GOEMETRY DRAWINGS

UNIT CODE: ENG/CU/AUT/CC/1/4/A

Relationship to Occupational Standards

This unit addresses the unit of competency: **Prepare and Interpret Applied Goemetry Drawings**

Duration of Unit: 50 hours

Unit Description

This unit covers the competencies required to prepare and interpret applied geometry drawings. It involves selecting, using and maintaining drawing equipment and materials. It also involves printing, constructing of lines and interpreting symbols, producing plane and solid geometry drawings and producing pictorial and orthographic drawings of components.

Summary of Learning Outcomes

1. Use and maintain drawing equipment and materials.
2. print, construct lines and interpret symbols,
3. Produce plane geometry drwaings
4. Produce solid geometry drawings
5. Produce pictorial and orthographic drawings of components.

Learning Outcomes, Content and Suggested Assessment Methods:

Learning Outcome	Content	Suggested Assessment Methods
1. Use and maintain drawing equipment and materials	• Drawing equipment • Using and maintaining drawing equipment • Storing drawing equipment • Waste disposal • Safety and environmental regulations	• Observation • Oral questioning • Written tests
2. Print, construct lines and interpret symbols	• Printing of letters and numbers	• Oral questioning • Practical tests

	• Types of lines, symbols and abbreviations • Bisecting lines and angles • Dimensioning •	• Observation
3. Produce plane geometry drawings	• Triangles • Quardrilatels • Polygons • Types of angles	• Observation • Practical tests • Oral questioning
4. Produce Solid geometry drawings	• Regular solids • Development of regular solids • True shapes of sections	• Observation • Practical tests • Oral questioning
5. Produce pictorial and orthographic drawings of components	• Orthorgraphic symbols and abbreviations • Isometric • Oblique • Orthorgraphic	• Observation • Oral questioning • Practical tests

Suggested Methods of Instruction:

- Projects
- Demonstration by trainer
- Practice by the trainee
- Discussions

Recommended Resources

- Drawing room
- Drawing instruments e.g. T-squares, set squares, drawing sets
- Drawing tables
- Pencils, papers, erasers
- Masking tapes

BASIC MATHEMATICS

UNIT CODE: ENG/CU/AUT/CC/2/4/A

Relationship to Occupational Standards

This unit addresses the unit of competency: **Apply Basic Mathematics**

Duration of Unit: 50 hours

Unit Description

This unit describes the competencies required in order to apply basic mathematics. It also involves applying basic arithmetic, rational arithmetic, mensurative skills,mensulation, algebra and geometrical calculations.

Summary of Learning Outcomes

1. Apply basic arithmetic
2. Apply rational arithmetic
3. Apply manipulative skills
4. Apply mensuration
5. Apply algebra
6. Apply geometrical calculations

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply basic arithmetic	• Types of numbers • Arithmetic operations • Calculations using indices	Written tests Oral questioning Assignments Supervised exercises
2. Apply rational arithmetic	• Converting fractions to percentages • Direct and inverse proportions	Written tests Oral questioning Assignments Supervised exercises

3. Apply manipulative skills	• Expressing decimals into fractions • Significant and non-significant	Assignments Oral questioning Supervised exercises Written tests
4. Apply mensuration	• Concerting units • Calculating areas, volume and perimeters	Assignments Oral questioning Practical tests Observation Supervised exercises Written tests
5. Apply algebra	• Linear equations • Simultaneous equations	Assignments Supervised exercises Written tests
6. Apply geometrical calculations	• Areas of triangles and quadrilaterals	Assignments Oral questioning Supervised exercises Written tests

Suggested Methods of Instruction:

- Group discussions
- Demonstration by trainer
- Exercises by trainee

Recommended Resources

- Scientific Calculators
- Rulers, pencils, erasers
- Charts with presentations of data
- Graph books
- Dice
- Computers with internet connection

BASIC SCIENCE PRINCIPLES

UNIT CODE: ENG/CU/AUT/CC/3/4/A

Relationship to Occupational Standards

This unit addresses the unit of competency: **Apply Basic Science Principles**

Duration of Unit: 50 hours

Unit Description

This unit describes the competencies required in order to apply basic science principles. It involves interpreting units and measurements, resolving forces,work, energy and power, determining effect of friction in automotive, solving problems related to light and sound, general chemistry, element and compounds and distinguishing metals and alloys.

Summary of Learning Outcomes

1. Interpret units and measurements,
2. Resolve forces,work, energy and power
3. Determine effect of friction in automotive
4. Solve problems related to light and sound
5. Solve problems related to general chemistry, element and compounds
6. Distinguish metals and alloys.

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Interpret units and measurements	• Units of measurements • Convertion of units	• Written tests • Oral questioning • Assignments • Supervised exercises
2. Resolve forces, work, energy and power	• Types of forces • Work energy and power • Energy convertion • Simple calculations of work power and energy	• Written tests • Oral questioning • Assignments • Supervised exercises.

		• Practical tests
3. Determine effect of friction in automotive	• Laws of friction • Advatages of friction • Effects of friction • Simple calculations involviving friction	• Assignments • Oral questioning • Supervised exercises • Written tests. • Practical tests
4. Solve problems related to light and sound	• Sources of lifgt • Sources of sound • Reflection and refration of light • Light images formed on plane and curved mirrors • Primary and secondary colours in light • Simple calculations involving location of light images • Propagation of sound • Properties of sound • Velocity of sound in air	• Assignments • Oral questioning • Practical tests • Observation • Supervised exercises • Written tests
5. Solve problems related to general chemistry, elements and compounds	• Definitation of matter • Classification of matter • Structure of atoms • Properties of elements and compounds • Properties of acids and bases	• Assignments • Supervised exercises • Written tests • Practical test
6. Distinguish metals and alloys	• Metals • Alloys • Uses of alloys	• Assignments • Oral questioning • Practical tests • Observation • Supervised exercises • Written tests

Suggested Methods of Instruction:

- Group discussions
- Demonstration by trainer
- Online videos
- Power point presentation
- Exercises by trainee

Recommended Resources

- Scientific Calculators
- Relevant reference materials
- Stationeries
- Automotive workshop
- Relevant practical materials
- Laboratories
- Internet

WORKSHOP TECHNOLOGY APPLICATIONS

UNIT CODE: ENG/AUT/CC/4 /4/A

Relationship to Occupational Standards:

This unit addresses the unit of competency: **Perform workshop applications**

Duration of Unit: 50 Hours

Unit description

This unit describes the competencies required to perform workshop applications. It involves using applied geometry to plan work operations, choosing appropriate tool and materials, measuring and marking out dimensions on workpieces, using hand tools to cut and file parts, assembling metal parts and sub-assemblies, polishing finished work, inspecting finished work for accuracy, maintaining of tools and equipment and performing housekeeping,

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Summary of Learning Outcome

1. Use applied geometry to plan work operations
2. Choose appropriatre tools and materials
3. Measure and markout dimensions on workpieces
4. Use hand tools to cut and file parts
5. Assemble metal parts and sub-assemblies
6. Polish finished work
7. Inspect finished work for accuracy
8. Maintain tools and equipment
9. Perform housekeeping

Learning Outcomes, Content and suggested assessment methods

Learning Outcome	Content	Suggested Assessment Methods
1. Use applied geometry to plan work operations	• Interpretation of geometrical drwaings • Operation plans • Standard drawing conventions	Observation Oral Written
2. Choose appropriate	• Tools and equipment • Cleaning work area	Observation Oral

Learning Outcome	Content	Suggested Assessment Methods
tools and materials		Written
3. Measure and mark out dimensions on workpieces)	• use of measuring tools and equipment • use of marking out tools and equipment	• Observation • Oral • Written
4. Use hand tools to cut and file parts	• Cutting • Filing	• Observation • Oral • Written
5. Assemble metal parts and sub-assemblies	• Soldering • Riveting • Welding • Brazing • fastening	• Observation • Oral • Written
6. Polish finished work	• Polishing and polishing materials	• Observation • Oral • Written
7. Inspect finished work for accuracy	• Inspection of finished work • Adjustments on finished work	• Observation • Oral • Written
8. Maintenan tools and equipment	• Tools and equipment maintenance eg. Oiling, grinding, greasing	• Observation • Oral • Written
9. Perform housekeeping	• Waste disposal • Environmental regulations • Cleaning work area	• Observation • Oral • Written

Suggested Methods of Instruction:

- Demonstration by trainer
- Practical work by trainee(s)

- Industrials visits
- Internet.
- Simulation

List of Recommended Resources

- Tools and equipment suggested but not limited to:
    - Welding
- Vices
- Cutting tools
- Combination square
    - Centre punch
    - scribers
- calipers
    - Dies and taps
- Surface plate
- V-blocks
    - Dial gauge
    - Engineer's square
- File card
- Assorted Files
    - Clamps
- Assorted hand tools
    - Hammers
- Measuring tools
- Assorted inspection tools and equipment
    - Inspection and measuring tools, GO and NOT GO gauges
    - Jigs and fixture
    - Pliers
- Rotary disc abrasive grinder
    - Saw
    - Screwdrivers
    - Spiral lowering
    - Tap wrench
    - Vacuum cleaners
    - V-block

- Workbenches
    - Vacuum cleaners
- Mops/ Brooms and buckets
    - Firefighting equipment
- First Aid kit

Materials and supplies suggested but not limited to:

- Personal safety gear:
- Goggles
- Safety shoes
- Overall
- Cap
- Ear Muffs
- Gloves
- Drawing papers
- Raw materials
- Mild steel plate
- Sheet metal
- Brass sheets
- Zinc sheets
- Aluminum sheets
- Bright Drawn Mild Steel
- Carbon steel
- Brass rods
- Aluminum rods
- Abrasive materials
- Grinding paste
- Cotton wastes
- Cleaning detergents

MAINTAINING WORKSHOP TOOLS, EQUIPMENT AND MEASURING DEVICES

UNIT CODE: ENG/CC/AUT/CC/5/4/A

Relationship to Occupational Standards

This unit addresses the unit of competency: **maintain workshop tools, equipment and measuring devices**

Duration of Unit: 20 hours

Unit description

This unit specifies the competencies required to maintain workshop tools, equipment and measuring devices. It involves identifying workshop tools, equipment and measuring devices, assessing need to maintain and maintaining tools, equipment and measuring devices and preparing workshop tools, equipment and measuring devices maintenance reports.

Summary of Learning Outcomes

1. Identify workshop tools, equipment and measuring devices
2. Assess need to maintain workshop tools, equipment and measuring devices
3. Maintain the tools, equipment and measuring devices
4. Prepare workshop tools, equipment and measuring devices report

Learning Outcomes, Content and Suggested Assessment Methods

Learning outcome	Content	Suggested Assessment Methods
1. Identify workshop tools, equipment and measuring devices	• Identifying appropriate PPEs • Identifying tools, equipment and measuring devices	• Observation • Written • Oral
2. Assess need to maintain	• Using manufacturers specifications	• Observation • Written

workshop tools, equipment and measuring devices	• Methods and procedures used in maintenance • Frequency and rate at which tools, equipment and measuring devices are used	• Oral
3. Maintain the tools, equipment and measuring devices	• Storing of tools, equipment and measuring devices • Handling of tools, equipment and measuring devices • Cleaning of tools, equipment and measuring devices • Faults on tools, equipment and measuring devices	• Observation • Written • Oral
4. Prepare workshop tools, equipment and measuring devices report	• Maintenance report showing dates and schedule of maintenance	• Observation • Written • Oral

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;
- The delivery may also be supplemented and enhanced by the following, if the opportunity allows:
- Visiting lecturer/trainer from the motor vehicle service and repair sector;
- Industrial visits.

Recommended Resources

Tools and Equipment

- Steel rule
- Vernier caliper
- Micrometre screw gauge
- Vernier height gauge

- Assorted spanners
- Bevels gauges
- Bench vice
- V-Block
- Angle plate
- Hand vice
- Screw drivers
- Pliers
- Oil can
- Grease gun
- Jack
- Axle stands
- Car hoist
- Hammers
- pressure gauges
- dial gauges
- Straight edge
- compression gauges
- Coolant pressure gauges

Materials and supplies

- Oil and paraffin
- Cleaning materials
- Hand cleaner
- Duster
- Cotton waste

CORE UNITS OF LEARNING

VEHICLE BASIC MAINTENANCE

UNIT CODE: **ENG/CU/AUT/CR/1/4/A**

Relationship to Occupational Standards

This unit addresses the unit of competency: **Perform vehicle basic maintenance.**

Duration of Unit: 50 hours

Unit Description

This unit specifies the competencies required to perform vehicle basic maintenance. It involves performing basic vehicle mechanical and operational assessment, basic maintenance on engine, braking system, suspension/steering system, transmission system, electrical system, Wheels and tires and preparing vehicle basic maintenance report.

Summary of Learning Outcomes

1. Perform basic vehicle mechanical and operational assessment
2. Perform engine basic maintenance
3. Perform braking system basic maintenance
4. Perform suspension/steering systems basic maintenance
5. Perform transmission system basic maintenance
6. Perform electrical system basic maintenance
7. Perform wheels and tires basic service/maintenance
8. Prepare vehicle basic maintenance report

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Perform basic vehicle mechanical and operational assessment	• Assembling of tools, equipment and checklist • Conducive working environment (OSHA 2007) • Undertaking assessment in accordance with manufacturers routine • Preparing periodic maintenance schedule	• Observation • Written • Oral
2. Perform engine basic maintenance	• Sourcing Technical information	• Observation • Written

	• Inspections on engine and externally attached components • Services/repairs/replacements of worn out/broken/damaged/clogged components • Filling up of engine basic maintenance checklist	• Oral
3. Perform braking system basic maintenance	• Inspections on vehicle braking system • Faults in braking system • Services on vehicle braking system • Adjustments on vehicle braking system	• Observation • Written • Oral
4. Perform suspension/steering systems basic maintenance	• Suspension and steering systems components check list • Inspections on suspension and steering systems components • Faults in suspension and steering systems • Adjustments on suspension and steering systems components	• Observation • Written • Oral
5. Perform transmission system basic maintenance	• Transmission system component check list • Inspections on transmission system components • Checking of oil levels • Identifying faults in transmission system(Breakages, wear) • Services in transmission system components • Lubrication(greasing, oiling) and adjustments on transmission system components	• Observation • Written • Oral

6. Perform electrical system basic maintenance	• Vehicle Electrical systems check list • Vehicle Battery condition and state of charge • Inspection on starter motor operational condition • Faults in a starter motor • Vehicle lighting system operational condition • Faults in lighting circuits • Ignition system operational condition • Faults in ignition system • Services in electrical system • Tests in electrical system	• Observation • Written • Oral
7. Perform Wheels and tires basic service/maintenance	• Identification of wheels and tires • Wheels and tires specifications • Wheels and tires repair kit • Repairs/services on wheels and tires	• Observation • Written • Oral
8. Prepare vehicle basic maintenance report	• Cleaning of vehicle interior and exterior • Vehicle basic maintenance report • Cleaning of workshop • Disposal of wastes	• Observation • Written • Oral

Suggested Methods of Instruction:

- Presentations and practical demonstrations by trainer;
- Guided learner activities
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the motor vehicle service and repair sector;
- Industrial visits.

Recommended Resources

Tools

- Comprehensive set of hand tools for motor vehicle maintenance and repair.

Equipment

- A fully equipped motor vehicle maintenance workshop;
- Fully functional light vehicle(s);
- Vehicle lift;
- Specialist tools and diagnostic equipment appropriate for the different makes of vehicles that are being maintained;
- Exhaust emission tester;
- Headlamp alignment equipment;
- Internet access to manufacturers' technical information;
- Torque setting tools;
- Personal protective equipment (PPE) and suitable coverings to protect vehicles;
- Facilities for the disposal of waste oil and used parts;
- Customer database and systems for recording maintenance records

Materials and supplies

- Engine and transmission lubricants
- Fluids for cooling systems, brakes, clutch, windscreen washer, hydraulic power assisted steering and diesel engine exhaust emission control;
- Replacement parts including:
- Air, oil, exhaust, and air conditioning filters;
- Oil seals and gaskets;
- Brake pads and linings;
- Spark plugs;
- Screen wiper blades;
- Tire patches
- Glue
- Drive belts.
- Vehicle cleaning materials;
- Hand cleaner.

Tools

- Comprehensive set of hand tools for motor vehicle maintenance and repair

SERVICING AND REPAIRING VEHICLE ENGINES

UNIT CODE: ENG/CR/AUT/CR/2/4/A

Relationship to Occupational Standards

This unit addresses the unit of competency: **Service and repair vehicle engines.**

Duration of Unit: 70 hours

Unit description:
This unit specifies competencies required to service and repair vehicle engine. It involves disassembling the engine, inspecting, servicing/replacing engine parts/components, assembling the engine, performing engine basic tests and preparing vehicle service/repair reports.

Summary of Learning Outcomes:

1. Disassemble engine
2. Clean and inspect engine parts/components
3. Service/replace vehicle engine parts/component
4. Assemble engine
5. Perform engine basic tests and prepare service/repair report

Learning Outcomes, Content and Suggested Assessment Methods

Learning outcome	Content	Suggested Assessment methods
1. Disassemble vehicle engine	• Appropriate tools and equipment. • Use of Personal protective equipment (PPE) • Health, safety environment and quality regulations • Function of the engine • Operating principle of the engine. • Construction of engine. • Prior inspection of engine parts.	• Practical/observation • Oral questioning • Written test

	• Dismantling Engine	
2. Clean and inspect engine parts/components	• Cleaning and inspecting vehicle Engine part/components. • Operating principle of engine components. • Inspections on engine parts/components • Manufacturers specifications on engine parts/components • Construction of engine components.	• Practical/observation • Oral questioning • Written test • Learner portfolio of evidence
3. Service/replace vehicle engine parts/component	• Services on vehicle engine parts/components • Replacing defective vehicle engine parts/components • Adjustments/alignments on engine parts/components	• Practical/observation • Oral questioning • Written test
4. Assemble engine	• Identifying vehicle engine parts/components. • Assembling procedure of vehicle engine parts/components	• Practical/observation • Oral questioning • Written test
5. Perform vehicle engine basic tests and prepare service/repair report	• Vehicle Engine basic tests. – e.g. manually rotating engine • Engine adjustment and timing marks alignments • Disposal of waste materials • Preparing service /repair report.	• Practical/observation • Oral questioning • Written test. • Report written

Suggested Methods of Instruction:

- Presentations and practical demonstrations by trainer;
- Guided learner activities
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the motor vehicle service and repair sector;
- Industrial visits.

Recommended Resources

Tools

- Comprehensive set of hand tools for the service and repair of motor vehicle Engines.

Equipment

- Engine instructional models;
- A fully equipped motor vehicle maintenance workshop;
- Functional vehicle Engine.
- Vehicle lift/inspection pit;
- Specialist tools and equipment appropriate for the different makes and types of vehicle engines that are being maintained;
- Internet access to manufacturers' technical information/data
- Torque setting tools;
- Personal protective equipment (PPE) and suitable coverings to protect vehicles;
- Vehicle protective coverings;
- Facilities for the disposal of waste oil and used parts
- Customer database and systems for recording maintenance records

Materials and supplies

- Digital instructional material including DVDs and CDs;
- Consumables for service and repair of vehicle engines including:
- Engine lubricants;
- Sealants, oil seals and gaskets;
- Cleaning materials;
- Hand cleaner
- Cotton waste for cleaning

SERVICING AND REPAIRING VEHICLE FUEL SYSTEMS

UNIT CODE: ENG/CR/AUT/CR/3/4/A

Relationship to Occupational Standards

This unit addresses the unit of competency: **Service and repair vehicle fuel system.**

Duration of Unit: 40 hours

Unit description:

This unit specifies competencies required to service and repair vehicle fuel system. It involves, inspecting, removing, dismantling, and servicing/repairing/replacing fuel system components. It also involve assembling, testing and fitting fuel system components to the vehicle, carry out adjustment and testing the fuel system.

Summary of Learning Outcomes:

1. Inspect and remove vehicle fuel system components.
2. Dismantle, Service/repair/replace worn out vehicle fuel system components.
3. Assemble fuel system components and test for correct operation
4. Fit vehicle fuel system components, carryout adjustments, test fuel system and write report.

Learning Outcomes, Content and Suggested Assessment Methods

Learning outcomes	Content	Suggested Assessment Methods
1. Inspect and remove vehicle fuel system components.	• Function of vehicle fuel system. • Operating principle of vehicle fuel system • Personal protective equipment (PPE). • Health, safety environment and quality regulations. • Using tools and equipment	• Practical/observation • Oral questioning • Written test

	• Identifying Vehicle fuel system Components. • Removing Vehicle fuel system Components. • Vehicle fuel system components inspections	
2. Dismantle, Service/repair/replace worn out vehicle fuel system components.	• Operating principle of vehicle fuel system components • Construction of vehicle fuel system components • Dismantling procedure of Vehicle fuel system Components • Services/repairs on vehicle fuel system components.	• Practical/observation • Oral questioning • Written test
3. Assemble fuel system components and test for correct operation	• Identifying and arranging vehicle fuel system ***components*** parts • Vehicle fuel system components Assembling procedure. • Vehicle fuel system tests and adjustments	• Practical/observation • Oral questioning • Written test • Learner portfolio of evidence.
4. Fit vehicle fuel system components , carryout adjustments, test fuel system and write report,	• Identifying, fitting and ***adjusting*** Vehicle fuel system components. • Service /repair report. • Waste disposal	• Practical/observation • Oral questioning • Written test • Learner portfolio of evidence.

Suggested Methods of Instruction:

- Presentations and practical demonstrations by trainer;
- Guided learner activities
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the motor vehicle service and repair sector;
- Industrial visits.

Recommended Resources

Materials and supplies

- Digital instructional material including DVDs and CDs;
- Consumables for service and repair of vehicle fuel systems including;
- Pump seals and gaskets;
- fuel;
- Cleaning materials;
- Hand cleaner;
- Dusters.

Equipment

- Fuel system Instructional models;
- A fully equipped motor vehicle maintenance workshop;
- Fully functional vehicle(s)
- Functional fuel system;
- Vehicle lift/inspection pit;
- Specialist tools and diagnostic equipment appropriate for the different makes and types of vehicle that are being maintained;
- Internet access to manufacturers' technical information;
- Torque setting tools;
- Personal protective equipment (PPE) and suitable coverings to protect vehicles;
- Facilities for the disposal of waste oil and used parts;
- Customer database and systems for recording maintenance records.

Tools

- Comprehensive set of hand tools for the service and repair of motor vehicle fuel system

SERVICING VEHICLE STEERING AND SUSPENSION SYSTEMS

UNIT CODE: ENG/CU/AUT/CR/4/4/A

Relationship to Occupational Standards

This unit addresses the unit of competency: **Service Vehicle Steering And Suspension System.**

Duration of Unit: 60 hours

Unit Description:
This unit specifies competencies required to service vehicle steering and suspension systems. It involves inspecting steering and suspension system parts, removing steering and suspension system components, dismantling, cleaning and examining the components, servicing/repairing/ replacing and assembling steering/ suspension parts, fitting steering and suspension components and carrying out adjustment and reporting.

Summary of Learning Outcomes

1. inspect steering and suspension system parts
2. remove steering and suspension system components from the vehicle
3. dismantle, clean and examine steering and suspension system components
4. service/repair/ replace and assemble steering and suspension parts
5. fit steering and suspension components to the vehicle
6. Carry out adjustment and reporting.

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Inspect steering and suspension system parts	• Preparing work area, steering and suspernsion units • Assembling ***tools and equipment*** • Preparing vehicle steering/ suspension system checklist	• Observation • Written • Oral

	• Personal protective clothing and equipment (***ppe***) and safety regulations (***osha 2007*** , hse&q***)*** • Inspecting steering/ suspension systems • Identifying faulty steering/ suspension components	
2. Remove steering and suspension system components	• ***Technical information*** • Raising of Vehicle • Draining of ***Lubricants and fluids*** • Removing Steering/ suspension components	• Observation • Written • Oral
3. Dismantle, clean and examine steering and suspension system components	• Dismantling Steering/suspension components • Cleaning Steering/ suspension components. • Assessing Serviceability of steering/ suspension components	• Observation • Written • Oral
4. Service/repair/ replace and assemble steering and suspension parts	• Servicing Steering/ suspension components • Verifying and replacing Worn/damaged steering/ suspension • Re-assembling Steering/ suspension components	• Observation • Written • Oral
5. Fit steering and suspension components to vehicle	• Fitting Steering/ suspension components • Replenishing lubricants and fluids • Setting ***Steering geometry*** • Steering/ suspension system is tested as per the manufacturers specification	• Observation • Written • Oral

6. Carry out adjustment and reporting	• Completing service and repair of Steering/ suspension • Cleaning work area • Disposal of Waste • Writing Steering/ suspension report	• Observation • Written • Oral

Suggested Methods of Instruction:

- Presentations and practical demonstrations by trainer;
- Guided learner activities
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the motor vehicle service and repair sector;
- Industrial visits.

Recommended Resources

Tools, Equipment

- Steering wheel
- Steering column
- Universal joint/coupling
- Steering box
- Drop arm
- Steering arm
- Tie rods
- Track arms
- Wishbone/arms
- Shock absorbers/dampers
- Strut
- Stabilizer bar
- Springs

  -Coil/leaf/rubber/ Torsion bar/Pneumatic and Hydro pneumatic
- Bushes
- Hand tools
- PPEs
- Checklists
- Job cards

Materials and supplies

- Waste clothes

- Steering fluid
- Grease
- Arm bushes
- Dust seals
- rubber boots
- detergents

SERVICING VEHICLE BRAKING SYSTEMS

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

Relationship to Occupational Standards

This unit addresses the unit of competency: **service vehicle braking systems**

Duration of Unit: 60 hours

Unit Description

This unit specifies competencies required to service vehicle braking system. It involves inspecting braking system parts, removing, dismantling, cleaning and examining braking system components, servicing/repairing/ replacing and assembling braking system components, fitting braking system components and carrying out adjustments, testing and reporting.

Summary of Learning Outcomes

1. Inspect braking system parts
2. Remove, dismantle, clean and examine braking system components
3. Service/repair/ replace and assemble braking system components
4. Fit braking system components and carry out adjustments
5. Test and report.

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Inspect braking system parts	• Park and prepare vehicle • Assemble tools and equipment • Personal protective clothing and equipment (PPEs) • Safety regulations • Test and verify vehicle braking system • Filling braking system observation checklist	• Observation • Written • Oral
2. Remove, dismantle, clean and examine braking	• Removing braking system components as per manufacturers manual • Cleaning braking system components	• Observation • Written • Oral

system components	• Examining braking system components • Identifying Worn/damaged braking system components	
3. Service/repair/ replace and assemble braking system	• servicing braking system components • replacing Worn/damaged braking system parts • verifying replacement parts • re-assembling braking system components	• Observation • Written • Oral
4. Fit braking system components and carry out adjustments	• Fitting braking system components • carrying out Adjustments • Carrying out Bleeding of braking system • completing braking system service and repair	• Observation • Written • Oral
5. Test and report	• testing Braking system performance • writing and sharing braking system service and repair report • cleaning Work area • Waste is disposed regulations (OSH Act- 2007)	• Observation • Written • Oral

Suggested Methods of Instruction:

- Presentations and practical demonstrations by trainer;
- Guided learner activities
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the motor vehicle service and repair sector;
- Industrial visits.

Recommended Resources

Tools, Equipment

- Hand tools
- Assorted spanners

- Pliers
- Oil can
- Jack
- Axle stands
- Car hoist
- Hammers
- Bleeding can and pipes
- Disc
- Drum
- Shoes and linnings
- Pads
- Brake pipes
- Master cylinder
- Wheel cylinder
- Brake booster
- PPEs
- Checklists
- Job cards

Materials and supplies

- Waste clothes
- Steering fluid
- Grease
- Arm bushes
- Dust seals
- Rubber boots
- Checklists
- Job cards
- Detergents

SERVICING VEHICLE ELECTRICAL SYSTEMS.

UNIT CODE: ENG/CU/AUT/CR/6/4/A
Relationship to Occupational Standards

This unit addresses the unit of competency: **service vehicle electrical systems.**

Duration of Unit: 70 hours

Unit Description:
This unit specifies competencies required to service vehicle electrical systems. It involves inspecting vehicle electrical systems components, removing, dismantling, cleaning and examining electrical systems components, servicing/repairing/ replacing and assembling and testing vehicle electrical system components, fitting components, testing and preparing vehicle electrical systems service report.

Summary of Learning Outcomes

1. Inspect vehicle electrical systems components
2. Remove, dismantle, clean and examine vehicle electrical systems components
3. Service/repair/ replace and assemble and test vehicle electrical systems components
4. Fit components, test and prepare vehicle electrical systems service report.

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Inspect vehicle electrical systems components	• Parking and preparing Vehicle • Personal protective clothing and equipment (***PPE***) • Safety policy regulations (***OSHA 2007)*** • Inspecting vehicle electrical systems • Identifying vehicle electrical systems defect(s) • Identifying cause and location of vehicle electrical systems defects • Preparing vehicle electrical systems checklist	• Observation • Written • Oral
2. Remove, dismantle, clean and examine	• Removing ***Vehicle electrical components***	• Observation • Written • Oral

electrical systems components	• Dismantling vehicle electrical components • Cleaning vehicle electrical components • Examining Serviceability of vehicle electrical components	
3. Service/repair/ replace and assemble and test vehicle electrical systems components	• • Servicing/ Repairing vehicle electrical components • Verifying Worn/damaged vehicle electrical components • Assembling vehicle electrical components • Testing vehicle electrical system components	• Observation • Written • Oral
4. Fit components, test and prepare vehicle electrical systems service report.	• Fitting Vehicle electrical system components • Setting ***Beam*** • Testing vehicle electrical systems • Completing vehicle electrical systems services and repairs • Writing vehicle electrical systems reports • Cleaning work area • Disposal of Waste in accordance with OSHA regulations(act- 2007)	• Observation • Written • Oral

Suggested Methods of Instruction:

- Presentations and practical demonstrations by trainer;
- Guided learner activities
- Supervised activities and projects in a workshop;
- Visiting lecturer/trainer from the motor vehicle service and repair sector;
- Industrial visits.

Recommended Resources

Tools, Equipment

- Hand tools
- General workshop
- General hand tools for servicing vehicle electrical systems;
- Multi-meter
- Ignition test equipment.
- Hydrometer
- High rate discharge tester
- Feeler gauge
- Lighting system including bulbs and sockets;
- Beam setter
- Battery

Materials and supplies

- PPEs
- Checklists
- Job cards
- Waste clothes
- Detergents
- Electrical cables
- Fuses