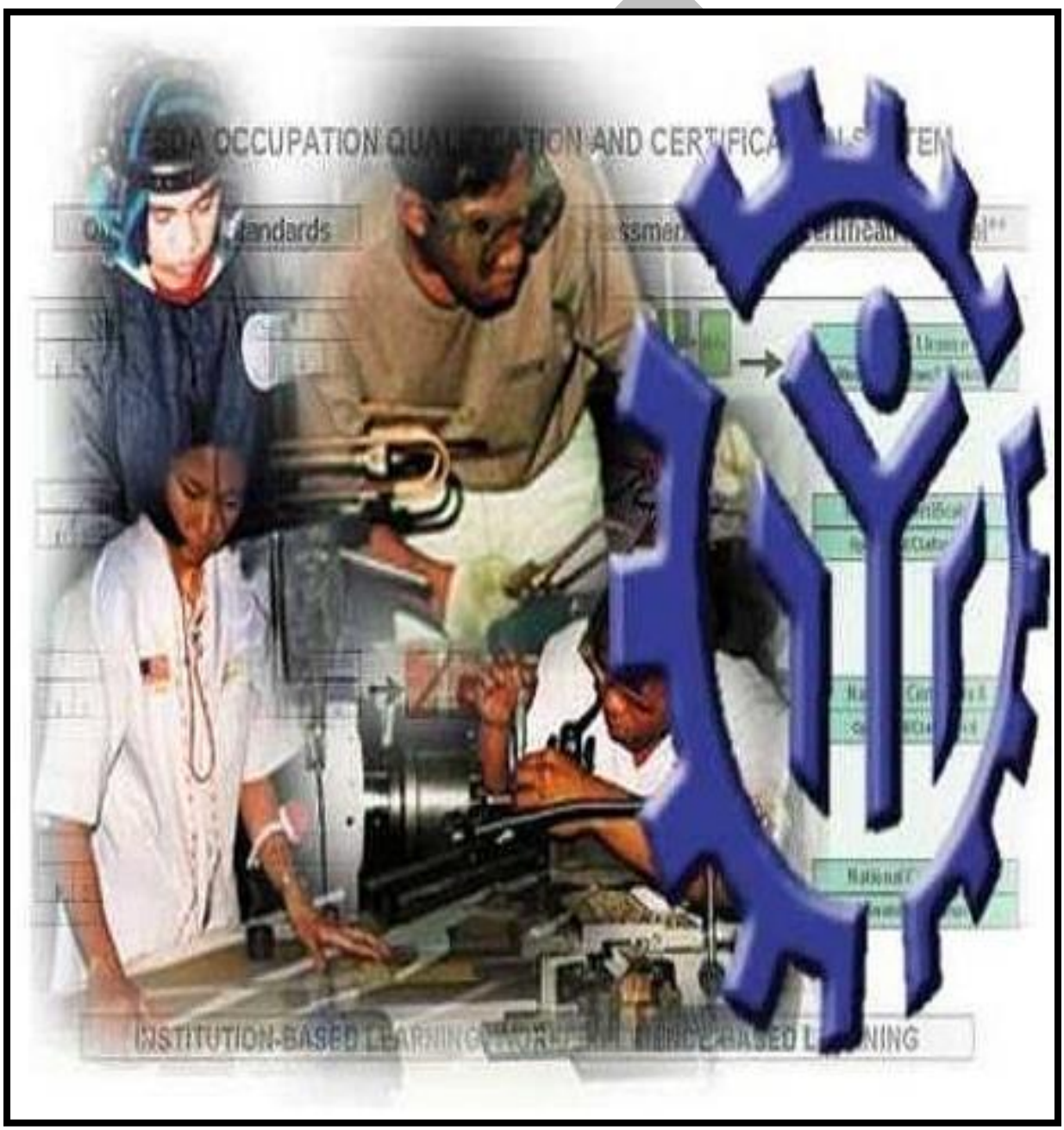
TRAINING REGULATIONS

AUTOMOTIVE SERVICING (ELECTRICAL REPAIR) NC II



AUTOMOTIVE AND LAND TRANSPORT SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
TESDA Complex East Service Road, South Luzon Expressway (SLEX),
Fort Bonifacio, Taguig City

Technical Education and Skills Development Act of 1994
(Republic Act No. 7796)

Section 22, “Establishment and Administration of the National Trade Skills Standards” of the RA 7796 known as the TESDA Act mandates TESDA to establish national occupational skill standards. The Authority shall develop and implement a certification and accreditation program in which private industry group and trade associations are accredited to conduct approved trade tests, and the local government units to promote such trade testing activities in their respective areas in accordance with the guidelines to be set by the Authority.

The Training Regulations (TR) serve as basis for the:

1. Competency assessment and certification;
2. Registration and delivery of training programs; and
3. Development of curriculum and assessment instruments.

Each TR has four sections:

Section 1 **Definition of Qualification** - describes the qualification and defines the competencies that comprise the qualification.

Section 2 **Competency Standards** - was revised to include the Required Knowledge and Required Skills per element. These fields explicitly state the required knowledge and skills for competent performance of a unit of competency in an informed and effective manner. These also emphasize the application of knowledge and skills to situations where understanding is converted into a workplace outcome.

Section 3 **Training Arrangements** - contain the information and requirements which serve as bases for training providers in designing and delivering competency-based curriculum for the qualification. The revisions to Section 3 entail identifying the Learning Activities leading to achievement of the identified Learning Outcome.

Section 4 **Assessment and Certification Arrangements** - describe the policies governing assessment and certification procedures for the qualification.

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TRAINING REGULATIONS FOR

AUTOMOTIVE SERVICING (ELECTRICAL REPAIR) NC II

SECTION 1 AUTOMOTIVE SERVICING (ELECTRICAL REPAIR) NC II QUALIFICATION

The **AUTOMOTIVE SERVICING (ELECTRICAL REPAIR) NC II** Qualification consists of competencies that a person must achieve to service manual air-conditioner system, diagnose and repair manual air- conditioner system, repair manual air-conditioner compressor magnetic clutch, diagnose and repair ignition system, diagnose and repair starting system, diagnose and repair charging system and diagnose and repair body electrical system.

This Qualification is packaged from the competency map of the Automotive and Land Transport Sector as shown in Annex A.

The Units of Competency comprising this Qualification include the following:

CODE NO.	BASIC COMPETENCIES
400311210	Participate in workplace communication
400311211	Work in team environment
400311212	Solve/address general workplace problems
400311213	Develop career and life decisions
400311214	Contribute to workplace innovation
400311215	Present relevant information
400311216	Practice occupational safety and health policies and procedures
400311217	Exercise efficient and effective sustainable practices in the workplace
400311218	Practice entrepreneurial skills in the workplace
CODE NO.	**COMMON COMPETENCIES**
ALT723211	Validate vehicle specification
ALT723212	Move and position vehicle
ALT723214	Utilize automotive tools
ALT723215	Perform mensuration and calculation
ALT723216	Utilize workshop facilities and equipment
ALT723217	Prepare servicing parts and consumables
ALT723218	Prepare vehicle for servicing and releasing
CODE NO.	**CORE COMPETENCIES**
ALT723392	Service manual air-conditioner system
ALT723393	Diagnose and repair manual air-conditioner system
ALT723394	Repair manual air-conditioner compressor magnetic clutch
ALT723395	Diagnose and repair ignition system
ALT723396	Diagnose and repair starting system
ALT723397	Diagnose and repair charging system
ALT723398	Diagnose and repair body electrical system

A person who has achieved this Qualification is competent to be:

- Electrical Technician (Automotive)
- Aircon Technician (Automotive)

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in **AUTOMOTIVE SERVICING (ELECTRICAL REPAIR) NC II**.

BASIC COMPETENCIES

UNIT OF COMPETENCY : PARTICIPATE IN WORKPLACE COMMUNICATION

UNIT CODE : 400311210

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Obtain and convey workplace information	1.1 Specific and relevant information is accessed from ***appropriate sources***. 1.2 Effective questioning, active listening and speaking skills are used to gather and convey information. 1.3 Appropriate ***medium*** is used to transfer information and ideas. 1.4 Appropriate non-verbal communication is used. 1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed. 1.6 Defined workplace procedures for the location and ***storage*** of	1.1 Effective verbal and nonverbal communication 1.2 Different modes of communication 1.3 Medium of communication in the workplace 1.4 Organizational policies 1.5 Communication procedures and systems 1.6 Lines of Communication 1.7 Technology relevant to the enterprise and the individual's work responsibilities 1.8 Workplace etiquette	1.1 Following simple spoken language 1.2 Performing routine workplace duties following simple written notices 1.3 Participating in workplace meetings and discussions 1.4 Preparing work-related documents 1.5 Estimating, calculating and recording routine workplace measures 1.6 Relating/ Interacting with people of various levels in the workplace 1.7 Gathering and providing basic information in response to

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	information are used. 1.7 Personal interaction is carried out clearly and concisely.		workplace requirements 1.8 Basic business writing skills 1.9 Interpersonal skills in the workplace 1.10 Active-listening skills
2. Perform duties following workplace instructions	2.1 Written notices and instructions are read and interpreted in accordance with organizational guidelines. 2.2 Routine written instruction are followed based on established procedures. 2.3 Feedback is given to workplace supervisor based instructions/ information received. 2.4 ***Workplace interactions*** are conducted in a courteous manner. 2.5 Where necessary, clarifications about routine workplace procedures and matters concerning conditions of employment are sought and asked from ***appropriate sources***. 2.6 Meetings outcomes are interpreted and implemented.	2.1 Effective verbal and non-verbal communication 2.2 Different modes of communication 2.3 Medium of communication in the workplace 2.4 Organizational/ Workplace policies 2.5 Communication procedures and systems 2.6 Lines of communication 2.7 Technology relevant to the enterprise and the individual's work responsibilities 2.8 Effective questioning techniques (clarifying and probing) 2.9 Workplace etiquette	2.1 Following simple spoken instructions 2.2 Performing routine workplace duties following simple written notices 2.3 Participating in workplace meetings and discussions 2.4 Completing work- related documents 2.5 Estimating, calculating and recording routine workplace measures 2.6 Relating/ Responding to people of various levels in the workplace 2.7 Gathering and providing information in response to workplace requirements 2.8 Basic questioning/ querying 2.9 Skills in reading for information 2.10 Skills in locating
3. Complete relevant work-related documents	3.1 Range of ***forms*** relating to conditions of	3.1 Effective verbal and non-verbal communication	3.1 Completing work-related documents

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	employment are completed accurately and legibly. 3.2 Workplace data is recorded on standard workplace forms and documents. 3.3 Errors in recording information on forms/ documents are identified and acted upon. 3.4 Reporting requirements to supervisor are completed according to organizational guidelines.	3.2 Different modes of communication 3.3 Workplace forms and documents 3.4 Organizational/ Workplace policies 3.5 Communication procedures and systems 3.6 Technology relevant to the enterprise and the individual's work responsibilities	3.2 Applying operations of addition, subtraction, division and multiplication 3.3 Gathering and providing information in response to workplace requirements 3.4 Effective record keeping skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Appropriate sources	May include: 1.1 Team members 1.2 Supervisor/Department Head 1.3 Suppliers 1.4 Trade personnel 1.5 Local government 1.6 Industry bodies
2. Medium	May include: 2.1 Memorandum 2.2 Circular 2.3 Notice 2.4 Information dissemination 2.5 Follow-up or verbal instructions 2.6 Face-to-face communication 2.7 Electronic media (disk files, cyberspace)
3. Storage	May include: 3.1 Manual filing system 3.2 Computer-based filing system
4. Workplace interactions	May include: 4.1 Face-to-face 4.2 Telephone 4.3 Electronic and two-way radio 4.4 Written including electronic means, memos, instruction and forms 4.5 Non-verbal including gestures, signals, signs and diagrams
5. Forms	May include: 5.1 HR/Personnel forms, telephone message forms, safety reports

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Prepared written communication following standard format of the organization 1.2 Accessed information using workplace communication equipment/systems 1.3 Made use of relevant terms as an aid to transfer information effectively 1.4 Conveyed information effectively adopting formal or informal communication
2. Resource Implications	**The following resources should be provided:** 2.1 Fax machine 2.2 Telephone 2.3 Notebook 2.4 Writing materials 2.5 Computer with Internet connection
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Demonstration with oral questioning 3.2 Interview 3.3 Written test 3.4 Third-party report
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or through an accredited institution

UNIT OF COMPETENCY : WORK IN TEAM ENVIRONMENT

UNIT CODE : 400311211

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes to identify one's roles and responsibilities as a member of a team.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Describe team role and scope	1.1 The ***role and objective of the team*** is identified from available ***sources of information***. 1.2 Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources.	1.1 Group structure 1.2 Group development 1.3 Sources of information	1.1 Communicating with others, appropriately consistent with the culture of the workplace 1.2 Developing ways in improving work structure and performing respective roles in the group or organization
2. Identify one's role and responsibility within a team	2.1 Individual roles and responsibilities within the team environment are identified. 2.2 Roles and objectives of the team is identified from available ***sources of information***. 2.3 Team parameters, reporting relationships and responsibilities are identified based on team discussions and appropriate external sources.	2.1 Team roles and objectives 2.2 Team structure and parameters 2.3 Team development 2.4 Sources of information	2.1 Communicating with others, appropriately consistent with the culture of the workplace 2.2 Developing ways in improving work structure and performing respective roles in the group or organization
3. Work as a team member	3.1 Effective and appropriate forms of communications are used and interactions undertaken with	3.1 Communication Process 3.2 Workplace communication protocol	3.1 Communicating appropriately, consistent with the culture of the workplace

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	team members based on company practices. 3.2 Effective and appropriate contributions made to complement team activities and objectives, based on ***workplace context***. 3.3 Protocols in reporting are observed based on standard company practices. 3.4 Contribute to the development of team work plans based on an understanding of team's role and objectives.	3.3 Team planning and decision making 3.4 Team thinking 3.5 Team roles 3.6 Process of team development 3.7 Workplace context	3.2 Interacting effectively with others 3.3 Deciding as an individual and as a group using group think strategies and techniques 3.4 Contributing to Resolution of issues and concerns

RANGE OF VARIABLES

VARIABLE	RANGE
1. Role and objective of team	May include: 1.1 Work activities in a team environment with enterprise or specific sector 1.2 Limited discretion, initiative and judgement maybe demonstrated on the job, either individually or in a team environment
2. Sources of information	May include: 2.1 Standard operating and/or other workplace procedures 2.2 Job procedures 2.3 Machine/equipment manufacturer's specifications and instructions 2.4 Organizational or external personnel 2.5 Client/supplier instructions 2.6 Quality standards 2.7 OHS and environmental standards
3. Workplace context	May include: 3.1 Work procedures and practices 3.2 Conditions of work environments 3.3 Legislation and industrial agreements 3.4 Standard work practice including the storage, safe handling and disposal of chemicals 3.5 Safety, environmental, housekeeping and quality guidelines

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Worked in a team to complete workplace activity 1.2 Worked effectively with others 1.3 Conveyed information in written or oral form 1.4 Selected and used appropriate workplace language 1.5 Followed designated work plan for the job
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 Role play involving the participation of individual member to the attainment of organizational goal 3.2 Case studies and scenarios as a basis for discussion of issues and strategies in teamwork 3.3 Socio-drama and socio-metric methods 3.4 Sensitivity techniques 3.5 Written Test
4. Context for Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY : **SOLVE/ADDRESS GENERAL WORKPLACE PROBLEMS**

UNIT CODE : **400311212**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to apply problem-solving techniques to determine the origin of problems and plan for their resolution. It also includes addressing procedural problems through documentation, and referral.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify routine problems	1.1 Routine **problems or procedural problem** areas are identified. 1.2 Problems to be investigated are defined and determined. 1.3 Current conditions of the problem are identified and documented.	1.1 Current industry hardware and software products and services 1.2 Industry maintenance, service and helpdesk practices, processes and procedures 1.3 Industry standard diagnostic tools 1.4 Malfunctions and resolutions	1.1 Identifying current industry hardware and software products and services 1.2 Identifying current industry maintenance, services and helpdesk practices, processes and procedures. 1.3 Identifying current industry standard diagnostic tools 1.4 Describing common malfunctions and resolutions. 1.5 Determining the root cause of a routine malfunction
2. Look for solutions to routine problems	2.1 Potential solutions to problem are identified. 2.2 Recommendations about possible solutions are developed, **documented**, ranked and presented to	2.1 Current industry hardware and software products and services 2.2 Industry service and helpdesk practices, processes and procedures	2.1 Identifying current industry hardware and software products and services 2.2 Identifying services and helpdesk practices,

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	appropriate person for decision.	2.3 Operating systems 2.4 Industry standard diagnostic tools 2.5 Malfunctions and resolutions. 2.6 Root cause analysis	processes and procedures. 2.3 Identifying operating system 2.4 Identifying current industry standard diagnostic tools 2.5 Describing common malfunctions and resolutions. 2.6 Determining the root cause of a routine malfunction
3. Recommend solutions to problems	3.1 Implementation of solutions are **planned**. 3.2 Evaluation of implemented solutions are planned. 3.3 Recommended solutions are documented and submit to appropriate person for confirmation.	3.1 Standard procedures 3.2 Documentation produce	3.1 Producing documentation that recommends solutions to problems 3.2 Following established procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Problems/Procedural Problem	May include: 1.1 Routine/non – routine processes and quality problems 1.2 Equipment selection, availability and failure 1.3 Teamwork and work allocation problem 1.4 Safety and emergency situations and incidents 1.5 Work-related problems outside of own work area
2. Appropriate person	May include: 2.1 Supervisor or manager 2.2 Peers/work colleagues 2.3 Other members of the organization
3. Document	May include: 3.1 Electronic mail 3.2 Briefing notes 3.3 Written report 3.4 Evaluation report
4. Plan	May include: 4.1 Priority requirements 4.2 Co-ordination and feedback requirements 4.3 Safety requirements 4.4 Risk assessment 4.5 Environmental requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Determined the root cause of a routine problem 1.2 Identified solutions to procedural problems. 1.3 Produced documentation that recommends solutions to problems. 1.4 Followed established procedures. 1.5 Referred unresolved problems to support persons.
2. Resource Implications	2.1 Assessment will require access to a workplace over an extended period, or a suitable method of gathering evidence of operating ability over a range of situations.
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Case Formulation 3.2 Life Narrative Inquiry 3.3 Standardized test The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : DEVELOP CAREER AND LIFE DECISIONS

UNIT CODE : 400311213

UNIT DESCRIPTOR : This unit covers the knowledge, skills, and attitudes in managing one's emotions, developing reflective practice, and boosting self-confidence and developing self-regulation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Manage one's emotion	1.1 **Self-management strategies** are identified. 1.2 Skills to work independently and to show initiative, to be conscientious, and persevering in the face of setbacks and frustrations are developed. 1.3 Techniques for effectively handling negative emotions and **unpleasant situation i**n the workplace are examined.	1.1 Self-management strategies that assist in regulating behavior and achieving personal and learning goals (e.g. Nine self-management strategies according to Robert Kelley) 1.2 Enablers and barriers in achieving personal and career goals 1.3 Techniques in handling negative emotions and unpleasant situation in the workplace such as frustration, anger, worry, anxiety, etc.	1.1 Managing properly one's emotions and recognizing situations that cannot be changed and accept them and remain professional 1.2 Developing self-discipline, working independently and showing initiative to achieve personal and career goals 1.3 Showing confidence, and resilience in the face of setbacks and frustrations and other negative emotions and unpleasant situations in the workplace
2. Develop reflective practice	2.1 Personal strengths and achievements, based on self-assessment strategies and teacher feedback are contemplated. 2.2 Progress when seeking and	2.1 Basic SWOT analysis 2.2 Strategies to improve one's attitude in the workplace 2.3 Gibbs' Reflective Cycle/Model (Description,	2.1 Using the basic SWOT analysis as self-assessment strategy 2.2 Developing reflective practice through realization of

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	responding to feedback from teachers to assist them in consolidating strengths, addressing weaknesses and fulfilling their potential are monitored. 2.3 Outcomes of personal and academic challenges by reflecting on previous problem solving and decision making strategies and feedback from peers and teachers are predicted.	Feelings, Evaluation, Analysis, Conclusion, and Action plan)	limitations, likes/ dislikes; through showing of self-confidence 2.3 Demonstrating self-acceptance and being able to accept challenges
3. Boost self-confidence and develop self-regulation	3.1 Efforts for continuous self-improvement are demonstrated. 3.2 Counter-productive tendencies at work are eliminated. 3.3 Positive outlook in life are maintained.	3.1 Four components of self-regulation based on Self-Regulation Theory (SRT) 3.2 Personality development concepts 3.3 Self-help concepts (e. g., 7 Habits by Stephen Covey, transactional analysis, psycho-spiritual concepts)	3.1 Performing effective communication skills – reading, writing, conversing skills 3.2 Showing affective skills – flexibility, adaptability, etc. 3.3 Self-assessment for determining one's strengths and weaknesses

RANGE OF VARIABLES

VARIABLE	RANGE
1. Self-management strategies	May include: 1.1 Seeking assistance in the form of job coaching or mentoring 1.2 Continuing dialogue to tackle workplace grievances 1.3 Collective negotiation/bargaining for better working conditions 1.4 Share your goals to improve with a trusted co-worker or supervisor 1.5 Make a negativity log of every instance when you catch yourself complaining to others 1.6 Make lists and schedules for necessary activities
2. Unpleasant situation	May include: 2.1 Job burn-out 2.2 Drug dependence 2.3 Sulking

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Express emotions appropriately 1.2 Work independently and show initiative 1.3 Consistently demonstrate self-confidence and self-discipline
2. Resource Implications	**The following resources should be provided:** 2.1 Access to workplace and resources 2.2 Case studies
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Demonstration or simulation with oral questioning 3.2 Case problems involving work improvement and sustainability issues 3.3 Third-party report
4. Context for Assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment

UNIT OF COMPETENCY : CONTRIBUTE TO WORKPLACE INNOVATION

UNIT CODE : 400311214

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to make a pro-active and positive contribution to workplace innovation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify opportunities to do things better	1.1 ***Opportunities for improvement*** are identified proactively in own area of work. 1.2 ***Information*** are gathered and reviewed which may be relevant to ideas and which might assist in gaining support for idea.	1.1 Roles of individuals in suggesting and making improvements. 1.2 Positive impacts and challenges in innovation. 1.3 Types of changes and responsibility. 1.4 Seven habits of highly effective people.	1.1 Identifying opportunities to improve and to do things better. Involvement 1.2 Identifying the positive impacts and the challenges of change and innovation 1.3 Identifying examples of the types of changes that are within and outside own scope of responsibility
2. Discuss and develop ideas with others	2.1 ***People who could provide input*** to ideas for improvements are identified. 2.2 Ways of approaching people to begin sharing ideas are selected. 2.3 Meeting is set with relevant people. 2.4 Ideas for follow up are review and selected based on feedback. 2.5 ***Critical inquiry method*** is used to discuss and develop ideas with others.	2.1 Roles of individuals in suggesting and making improvements 2.2 Positive impacts and challenges in innovation 2.3 Types of changes and responsibility. 2.4 Seven habits of highly effective people	2.1 Identifying opportunities to improve and to do things better. Involvement 2.2 Identifying the positive impacts and the challenges of change and innovation 2.3 Providing examples of the types of changes that are within and outside own scope of responsibility 2.4 Communicating ideas for change through small

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
			group discussions and meetings
3. Integrate ideas for change in the workplace	3.1 Critical inquiry method is used to integrate different ideas for change of key people. 3.2 Summarizing, analyzing and generalizing skills are used to extract salient points in the pool of ideas. 3.3 ***Reporting skills*** are likewise used to communicate results. 3.4 ***Current Issues and concerns*** on the systems, processes and procedures, as well as the need for simple innovative practices are identified.	3.1 Roles of individuals in suggesting and making improvements 3.2 Positive impacts and challenges in innovation 3.3 Types of changes and responsibility 3.4 Seven habits of highly effective people 3.5 Basic research skills	3.1 Identifying opportunities to improve and to do things better. Involvement 3.2 Identifying the positive impacts and the challenges of change and innovation 3.3 Providing examples of the types of changes that are within and outside own scope of responsibility 3.4 Communicating ideas for change through small group discussions and meetings 3.5 Demonstrating skills in analysis and interpretation of data

RANGE OF VARIABLES

VARIABLE	RANGE
1. Opportunities for improvement	May include: 1.1 Systems 1.2 Processes 1.3 Procedures 1.4 Protocols 1.5 Codes 1.6 Practices
2. Information	May include: 2.1 Workplace communication problems 2.2 Performance evaluation results 2.3 Team dynamics issues and concerns 2.4 Challenges on return of investment 2.5 New tools, processes and procedures 2.6 New people in the organization
3. People who could provide input	May include: 3.1 Leaders 3.2 Managers 3.3 Specialists 3.4 Associates 3.5 Researchers 3.6 Supervisors 3.7 Staff 3.8 Consultants (external) 3.9 People outside the organization in the same field or similar expertise/industry 3.10 Clients
4. Critical inquiry method	May include: 4.1 Preparation 4.2 Discussion 4.3 Clarification of goals 4.4 Negotiate towards a Win-Win outcome 4.5 Agreement 4.6 Implementation of a course of action 4.7 Effective verbal communication. See our pages: Verbal Communication and Effective Speaking 4.8 Listening 4.9 Reducing misunderstandings is a key part of effective negotiation 4.10 Rapport Building 4.11 Problem Solving 4.12 Decision Making 4.13 Assertiveness 4.14 Dealing with Difficult Situations
5. Reporting skills	May include: 5.1 Data management 5.2 Coding 5.3 Data analysis and interpretation

VARIABLE	RANGE
	5.4 Coherent writing 5.5 Speaking

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Identified opportunities to do things better. 1.2 Discussed and developed ideas with others on how to contribute to workplace innovation. 1.3 Integrated ideas for change in the workplace. 1.4 Analyzed and reported rooms for innovation and learning in the workplace.
2. Resource Implications	**The following resources should be provided:** 2.1 Pens, papers and writing implements 2.2 Cartolina 2.3 Manila papers
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Psychological and behavioral Interviews 3.2 Performance Evaluation 3.3 Life Narrative Inquiry 3.4 Review of portfolios of evidence and third-party workplace reports of on-the-job performance 3.5 Sensitivity analysis 3.6 Organizational analysis 3.7 Standardized assessment of character strengths and virtues applied
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : PRESENT RELEVANT INFORMATION

UNIT CODE : 400311215

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to present data/information appropriately.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Gather data/ information	1.1 Evidence, facts and information are collected. 1.2 Evaluation, terms of reference and conditions are reviewed to determine whether data/information falls within project scope.	1.1 Organisational protocols 1.2 Confidentiality 1.3 Accuracy 1.4 Business mathematics and statistics 1.5 Data analysis techniques/procedures 1.6 Reporting requirements to a range of audiences 1.7 Legislation, policy and procedures relating to the conduct of evaluations 1.8 Organisational values, ethics and codes of conduct	1.1 Describing organisational protocols relating to client liaison 1.2 Protecting confidentiality 1.3 Describing accuracy 1.4 Computing business mathematics and statistics 1.5 Describing data analysis techniques/ procedures 1.6 Reporting requirements to a range of audiences 1.7 Stating legislation, policy and procedures relating to the conduct of evaluations 1.8 Stating organisational values, ethics and codes of conduct
2. Assess gathered data/ information	2.1 Validity of data/ information is assessed.	2.1 Business mathematics and statistics	2.1 Computing business mathematics and statistics

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.2 Analysis techniques are applied to assess data/ information. 2.3 Trends and anomalies are identified. 2.4 ***Data analysis techniques*** and procedures are documented. 2.5 Recommendations are made on areas of possible improvement.	2.2 Data analysis techniques/ procedures 2.3 Reporting requirements to a range of audiences 2.4 Legislation, policy and procedures relating to the conduct of evaluations 2.5 Organisational values, ethics and codes of conduct	2.2 Describing data analysis techniques/ procedures 2.3 Reporting requirements to a range of audiences 2.4 Stating legislation, policy and procedures relating to the conduct of evaluations 2.5 Stating organisational values, ethics and codes of conduct
3. Record and present information	3.1 Studied data/ information are recorded. 3.2 Recommendations are analysed for action to ensure they are compatible with the project's scope and terms of reference. 3.3 Interim and final reports are analysed and outcomes are compared to the criteria established at the outset. 3.4 Findings are presented to stakeholders.	3.1 Data analysis techniques/ procedures 3.2 Reporting requirements to a range of audiences 3.3 Legislation, policy and procedures relating to the conduct of evaluations 3.4 Organisational values, ethics and codes of conduct	3.1 Describing data analysis techniques/ procedures 3.2 Reporting requirements to a range of audiences 3.3 Stating legislation, policy and procedures relating to the conduct of evaluations 3.4 Stating organisational values, ethics and codes of conduct practices

RANGE OF VARIABLES

VARIABLE	RANGE
1. Data analysis techniques	May include: 1.1 Domain analysis 1.2 Content analysis 1.3 Comparison technique

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Determine data / information 1.2 Studied and applied gathered data/information 1.3 Recorded and studied data/information These aspects may be best assessed using a range of scenarios what ifs as a stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
2. Resource Implications	**Specific resources for assessment** 2.1 Evidence of competent performance should be obtained by observing an individual in an information management role within the workplace or operational or simulated environment.
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Written Test 3.2 Interview 3.3 Portfolio The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4. Context for Assessment	4.1 In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY : **PRACTICE OCCUPATIONAL SAFETY AND HEALTH POLICIES AND PROCEDURES**

UNIT CODE : **400311216**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to identify OSH compliance requirements, prepare OSH requirements for compliance, perform tasks in accordance with relevant OSH policies and procedures.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify OSH compliance requirements	1.1 Relevant ***OSH requirements, regulations, policies and procedures*** are identified in accordance with workplace policies and procedures. 1.2 OSH activity non-conformities are conveyed to ***appropriate personnel***. 1.3 ***OSH preventive and control requirements*** are identified in accordance with OSH work policies and procedures.	1.1 OSH preventive and control requirements 1.2 Hierarchy of Controls 1.3 Hazard Prevention and Control 1.4 General OSH principles 1.5 Work standards and procedures 1.6 Safe handling procedures of tools, equipment and materials 1.7 Standard emergency plan and procedures in the workplace	1.1 Communication skills 1.2 Interpersonal skills 1.3 Critical thinking skills 1.4 Observation skills
2. Prepare OSH requirements for compliance	2.1 OSH work activity material, tools and equipment requirements are identified in accordance with workplace policies and procedures. 2.2 Required OSH materials, tools and equipment are acquired in accordance with workplace policies and procedures.	2.1 Resources necessary to execute hierarchy of controls 2.2 General OSH principles 2.3 Work standards and procedures 2.4 Safe handling procedures of tools, equipment and materials 2.5 Different OSH control measures	2.1 Communication skills 2.2 Estimation skills 2.3 Interpersonal skills 2.4 Critical thinking skills 2.5 Observation skills 2.6 Material, tool and equipment identification skills

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.3 Required OSH materials, tools and equipment are arranged/ placed in accordance with OSH work standards.		
3. Perform tasks in accordance with relevant OSH policies and procedures	3.1 Relevant OSH work procedures are identified in accordance with workplace policies and procedures. 3.2 Work Activities are executed in accordance with OSH work standards. 3.3 ***Non-compliance work activities*** are reported to *appropriate personnel*.	3.1 OSH work standards 3.2 Industry related work activities 3.3 General OSH principles 3.4 OSH Violations Non-compliance work activities	3.1 Communication skills 3.2 Interpersonal skills 3.3 Troubleshooting skills 3.4 Critical thinking skills 3.5 Observation skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. OSH Requirements, Regulations, Policies and Procedures	May include: 1.1 Clean Air Act 1.2 Building code 1.3 National Electrical and Fire Safety Codes 1.4 Waste management statutes and rules 1.5 Permit to Operate 1.6 Philippine Occupational Safety and Health Standards 1.7 Department Order No. 13 (Construction Safety and Health) 1.8 ECC regulations
2. Appropriate Personnel	May include: 2.1 Manager 2.2 Safety Officer 2.3 EHS Offices 2.4 Supervisors 2.5 Team Leaders 2.6 Administrators 2.7 Stakeholders 2.8 Government Official 2.9 Key Personnel 2.10 Specialists 2.11 Himself
3. OSH Preventive and Control Requirements	May include: 3.1 Resources needed for removing hazard effectively 3.2 Resources needed for substitution or replacement 3.3 Resources needed to establishing engineering controls 3.4 Resources needed for enforcing administrative controls 3.5 Personal Protective equipment
4. Non OSH-Compliance Work Activities	May include non-compliance or observance of the following safety measures: 4.1 Violations that may lead to serious physical harm or death 4.2 Fall Protection 4.3 Hazard Communication 4.4 Respiratory Protection 4.5 Power Industrial Trucks 4.6 Lockout/Tag-out 4.7 Working at heights (use of ladder, scaffolding) 4.8 Electrical Wiring Methods 4.9 Machine Guarding 4.10 Electrical General Requirements 4.11 Asbestos work requirements 4.12 Excavations work requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Convey OSH work non-conformities to appropriate personnel 1.2 Identify OSH preventive and control requirements in accordance with OSH work policies and procedures 1.3 Identify OSH work activity material, tools and equipment requirements in accordance with workplace policies and procedures 1.4 Arrange/Place required OSH materials, tools and equipment in accordance with OSH work standards 1.5 Execute work activities in accordance with OSH work standards 1.6 Report OSH activity non-compliance work activities to appropriate personnel
2. Resource Implications	**The following resources should be provided:** 2.1 Facilities, materials tools and equipment necessary for the activity
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Observation/Demonstration with oral questioning 3.2 Third party report
4. Context for Assessment	4.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY : **EXERCISE EFFICIENT AND EFFECTIVE SUSTAINABLE PRACTICES IN THE WORKPLACE**

UNIT CODE : **400311217**

UNIT DESCRIPTOR : This unit covers knowledge, skills and attitude to identify the efficiency and effectiveness of resource utilization, determine causes of inefficiency and/or ineffectiveness of resource utilization and Convey inefficient and ineffective environmental practices.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify the efficiency and effectiveness of resource utilization	1.1 Required resource utilization in the workplace is measured using appropriate techniques. 1.2 Data are recorded in accordance with workplace protocol. 1.3 Recorded data are compared to determine the efficiency and effectiveness of resource utilization according to established ***environmental work procedures***.	1.1 Importance of Environmental Literacy 1.2 Environmental Work Procedures 1.3 Waste Minimization 1.4 Efficient Energy Consumptions	1.1 Recording Skills 1.2 Writing Skills 1.3 Innovation Skills
2. Determine causes of inefficiency and/or ineffectiveness of resource utilization	2.1 Potential causes of inefficiency and/or ineffectiveness are listed. 2.2 Causes of inefficiency and/or ineffectiveness are identified through deductive reasoning. 2.3 Identified causes of inefficiency and/or ineffectiveness are validated thru established	2.1 Causes of environmental inefficiencies and ineffective-ness	2.1 Deductive Reasoning Skills 2.2 Critical thinking 2.3 Problem Solving 2.4 Observation Skills

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	environmental procedures.		
3. Convey inefficient and ineffective environmental practices	3.1 Efficiency and effectiveness of resource utilization are reported to *appropriate personnel*. 3.2 Concerns related resource utilization are discussed with appropriate personnel. 3.3 Feedback on information/ concerns raised are clarified with appropriate personnel.	3.1 Appropriate Personnel to address the environmental hazards 3.2 Environmental corrective actions	3.1 Written and Oral Communication Skills 3.2 Critical thinking 3.3 Problem Solving 3.4 Observation Skills 3.5 Practice Environmental Awareness

RANGE OF VARIABLES

VARIABLE	RANGE
1. Environmental Work Procedures	May include: 1.1 Utilization of Energy, Water, Fuel Procedures 1.2 Waster Segregation Procedures 1.3 Waste Disposal and Reuse Procedures 1.4 Waste Collection Procedures 1.5 Usage of Hazardous Materials Procedures 1.6 Chemical Application Procedures 1.7 Labeling Procedures
2. Appropriate Personnel	May include: 2.1 Manager 2.2 Safety Officer 2.3 EHS Offices 2.4 Supervisors 2.5 Team Leaders 2.6 Administrators 2.7 Stakeholders 2.8 Government Official 2.9 Key Personnel 2.10 Specialists 2.11 Himself

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Measured required resource utilization in the workplace using appropriate techniques 1.2 Recorded data in accordance with workplace protocol 1.3 Identified causes of inefficiency and/or ineffectiveness through deductive reasoning 1.4 Validate the identified causes of inefficiency and/or ineffectiveness thru established environmental procedures 1.5 Report efficiency and effectives of resource utilization to appropriate personnel 1.6 Clarify feedback on information/concerns raised with appropriate personnel
2. Resource Implications	**The following resources should be provided:** 2.1 Workplace 2.2 Tools, materials and equipment relevant to the tasks 2.3 PPE 2.4 Manuals and references
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Demonstration 3.2 Oral questioning 3.3 Written examination
4. Context for Assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment 4.2 Assessment shall be observed while task are being undertaken whether individually or in-group

UNIT OF COMPETENCY : PRACTICE ENTREPRENEURIAL SKILLS IN THE WORKPLACE

UNIT CODE : 400311218

UNIT DESCRIPTOR : This unit covers the outcomes required to apply entrepreneurial workplace best practices and implement cost-effective operations.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Apply entrepreneurial workplace best practices	1.1 ***Good practices*** relating to workplace operations are observed and selected following workplace policy. 1.2 Quality procedures and practices are complied with according to workplace requirements. 1.3 Cost-conscious habits in ***resource utilization*** are applied based on industry standards.	1.1 Workplace best practices, policies and criteria 1.2 Resource utilization 1.3 Ways in fostering entrepreneurial attitudes: • Patience • Honesty • Quality-consciousness • Safety-consciousness • Resourceful-ness	1.1 Communication skills 1.2 Complying with quality procedures
2. Communicate entrepreneurial workplace best practices	2.1 Observed good practices relating to workplace operations are communicated to **appropriate person**. 2.2 Observed quality procedures and practices are communicated to appropriate person.	2.1 Workplace best practices, policies and criteria 2.2 Resource utilization 2.3 Ways in fostering entrepreneurial attitudes: • Patience • Honesty • Quality-consciousness	2.1 Communication skills 2.2 Complying with quality procedures 2.3 Following workplace communication protocol

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.3 Cost-conscious habits in resource utilization are communicated based on industry standards.	• Safety-consciousness • Resourceful-ness	
3. Implement cost-effective operations	3.1 Preservation and optimization of workplace resources is implemented in accordance with enterprise policy. 3.2 Judicious use of workplace tools, equipment and materials are observed according to manual and work requirements. 3.3 Constructive contributions to office operations are made according to enterprise requirements. 3.4 Ability to work within one's allotted time and finances is sustained.	3.1 Optimization of workplace resources 3.2 5S procedures and concepts 3.3 Criteria for cost-effectiveness 3.4 Workplace productivity 3.5 Impact of entrepreneurial mindset to workplace productivity 3.6 Ways in fostering entrepreneurial attitudes: • Quality-consciousness • Safety-consciousness	3.1 Implementing preservation and optimizing workplace resources 3.2 Observing judicious use of workplace tools, equipment and materials 3.3 Making constructive contributions to office operations 3.4 Sustaining ability to work within allotted time and finances

RANGE OF VARIABLES

VARIABLE	RANGE
1. Good practices	May include: 1.1 Economy in use of resources 1.2 Documentation of quality practices
2. Resources utilization	May include: 2.1 Consumption/ use of consumables 2.2 Use/Maintenance of assigned equipment and furniture 2.3 Optimum use of allotted /available time

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Demonstrated ability to identify and sustain cost-effective activities in the workplace 1.2 Demonstrated ability to practice entrepreneurial knowledge, skills and attitudes in the workplace.
2. Resource Implications	**The following resources should be provided:** 2.1 Simulated or actual workplace 2.2 Tools, materials and supplies needed to demonstrate the required tasks 2.3 References and manuals 2.3.1 Enterprise procedures manuals 2.3.2 Company quality policy
3. Methods of Assessment	**Competency in this unit should be assessed through:** 3.1 Interview 3.2 Third-party report
4. Context for Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group

COMMON COMPETENCIES

UNIT OF COMPETENCY : VALIDATE VEHICLE SPECIFICATION

UNIT CODE : ALT723211

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude to check body type of the vehicle, check vehicle engine type, check vehicle specifications and complete validation of vehicle specification.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Check body type of the vehicle	1.1 ***Kind of vehicle*** is determined according to job order. 1.2 ***Vehicle dimensions*** is determined according to manual. 1.3 ***Vehicle weight*** is determined according to the manual. 1.4 ***Body shape*** is determined according to the manual. 1.6 ***Power train*** is determined according to the manual. 1.7 Safety practices are applied following OSHS.	1.1 Kind of vehicle 1.1.1 Aerodyna-mics 1.1.2 Vehicle Dynamics 1.1.3 Body shapes 1.1.4 Power train 1.1.5 Major dimensions 1.2 Vehicle specifications 1.2.1 Vehicle performance 1.2.2 Weight & Measureme nts 1.3 Automotive history 1.4 Documentation/ Accomplishing checklist 1.5 Resources information 1.5.1 Bulletin 1.5.2 Shop manual 1.6 OSHS 1.7 PPEs 1.8 Attitude: 1.8.1 Patience 1.8.2 Attention to details	1.1 Identifying kind of vehicle, dimensions, weight, body shape, and power train 1.2 Accomplishing checklist 1.3 Estimating visually dimensions and masses 1.4 Utilizing resource information 1.5 Wearing PPEs 1.6 Applying safety practices
2. Check vehicle engine type	2.1 ***Engine type*** is identified according	2.1 Principles of internal combustions	2.1 Identifying engine type,

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	to industry standards. 2.2 Engine ***fuel/energy system*** is identified according to manual. 2.3 ***Engine components*** are identified following manual.	2.2 Principles of Electricity and motors 2.3 History of engines 2.4 Hybrid technology 2.5 Resources information 2.5.1 Bulletin 2.5.2 Shop manual	parts & components 2.2 Identifying fuel systems or energy systems 2.3 Utilizing resource information
3. Check vehicle specifications	3.1 VIN plate is inspected for specification of vehicle according to manual. 3.2 Vehicle specification is verified according to ***vehicle reference materials***. 3.3 Vehicle modifications and conversions are checked following the manual. 3.3 Vehicle conversions are inspected following the manual.	3.1 Fundamentals of Automotive engineering: 3.1.1 Understanding of power & torque 3.1.2 Gear Ratios 3.1.3 Vehicle Regulations 3.1.4 Knowledge of vehicle performance 3.1.5 Knowledge in Vehicle manufacturing process 3.1.6 Knowledge of vehicle use 3.1.7 Automotive history 3.2 Knowledge in specifications 3.3 Reading of brochure, owner's manuals 3.4 Reading of Resources information 3.4.1 Bulletin 3.4.2 Shop manual	3.1 Reading vehicle reference materials 3.2 Conducting vehicle inspection for modification and conversion 3.3 Comparing actual vehicle and specification sheets 3.4 Utilizing resource information
4. Complete validation of vehicle specification	4.1 Vehicle ownership is verified using repair order and vehicle reference materials.	4.1 Reporting to immediate superior 4.2 Documentation/ Accomplishing checklist	4.1 Verifying vehicle ownership 4.2 Accomplishing dealers check sheet 4.3 Reporting skills

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	4.2 ***Dealers check sheet*** is accomplished following industry standards. 4.3 ***Dealers check sheet*** is submitted to immediate superior following industry standards.	4.3 Attitude: 4.3.1 Accuracy	

RANGE OF VARIABLES

VARIABLE	RANGE
1. Kind of Vehicle	May include: 1.1 Motorized 1.2 Not Motorized 1.3 On-Road 1.4 Off-Road 1.5 Passenger 1.6 Commercial 1.7 Utility 1.8 Manned 1.9 Unmanned 1.10 Remote control 1.11 Automated/Self Driving 1.12 Guided
2. Vehicle Dimensions	May include: 2.1 Overall length 2.2 Overall width 2.3 Overall height 2.4 Wheelbase 2.5 Tread 2.6 Minimum running ground clearance 2.7 Room Length 2.8 Room Width 2.9 Room Height 2.10 Overhang front 2.11 Overhang rear 2.12 Angle of approach 2.13 Angle of departure
3. Vehicle Weight	May include: 3.1 Gross weight 3.2 Curb weight 3.3 Tare weight 3.4 Net weight
4. Body Shape	May include: 4.1 Sedan 4.2 Coupe 4.3 Hardtop 4.4 Convertible 4.5 Multipurpose vehicle (MPV) 4.6 Sports utility vehicle (SUV) 4.7 Truck 4.8 Tractor Head 4.9 Trailer 4.10 Special Utility Truck 4.11 Bus 4.12 Mini Bus 4.13 Articulated bus 4.14 Asian Utility Vehicle (AUV)

VARIABLE	RANGE
5. Power Train	May include: 5.1 Front Wheel Drive 5.2 Rear Wheel Drive 5.3 4x2 5.4 4x4 5.5 Limited Slip Differential (LSD) 5.6 Manual Transmission 5.7 Automatic Transmission 5.8 Continuously Variable Transmission
6. Engine Type	May include: 6.1 Internal Combustion Engine 6.2 Electric Motor
7. Fuel/Energy System	May include: 7.1 Diesel Fuel 7.2 Gasoline Fuel 7.3 Compressed Natural Gas (CNG) 7.4 Liquefied Petroleum Gas (LPG) 7.5 Methanol 7.6 Hydrogen 7.7 Biodiesel 7.8 Solar Cell 7.9 Fuel Cell
8. Engine Components	May include: 8.1 Intake System 8.2 Electrical System 8.3 Cooling System 8.4 Exhaust System 8.5 Valve Train System 8.6 Cylinder Head 8.7 Engine Block 8.8 Lubricating System
9. Vehicle reference materials	May include: 9.1 Warranty booklet 9.2 Brochure of the vehicle 9.3 Vehicle registration
10. Dealers check sheet	May include: 10.1 Vehicle mileage 10.2 Owner's information 10.3 Damage

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Checked body type of the vehicle 1.2 Checked vehicle engine type 1.3 Checked vehicle specifications 1.4 Completed validation of vehicle specification
2. Resource Implications	The following resources should be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate vehicle or model equivalent 2.3 Materials relevant to the activity 2.4 Resource information, references, and manual
3. Method of Assessment	Competency in this unit may be assessed through: 3.1 Direct Observation 3.2 Interview 3.3 Third Party Report 3.4 Written exam 3.5 Demonstration with Oral questioning
4. Context of Assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

UNIT OF COMPETENCY : MOVE AND POSITION VEHICLE

UNIT CODE : ALT723212

UNIT DESCRIPTOR : This unit involves the skills and knowledge and attitudes required to move and position vehicle safely including systematic and efficient control of all vehicle functions.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare vehicle for operation	1.1 Vehicle ***multi point inspection*** is conducted according to industry practice. 1.2 ***Cockpit Drill*** is performed according to industry practice. 1.3 Vehicle is start-up following owner's manual. 1.4 Parking brake is engaged according to industry practice.	1.1 Revolutions per minute during idle 1.2 Manual, automatic and CVT Transmission 1.3 Vehicle parts, components and functions 1.4 Inspection procedures 1.5 Owner's manual 1.6 Safety procedures	1.1 Performing Cockpit Drill 1.2 Conducting Vehicle Multi point inspection 1.3 Starting the engine 1.4 Using owner's manual
2. Position vehicle	2.1 ***Workshop hazards*** are identified and avoided as per standard operating procedures. 2.2 Vehicle is moved according to Occupational Health and Safety Standards. 2.3 Workshop rules and regulations are recognized according to standard procedures.	2.1 Revolutions per minute in running condition 2.2 Kilometer per hour 2.3 Estimation/ timing 2.4 Manual, automatic and CVT Transmission 2.5 Diesel, Gasoline and EV engines 2.6 Vehicle parts, components and functions 2.7 Defensive driving 2.8 Owner's Manual 2.9 Safety procedures	2.1 Skills in positioning vehicle 2.2 Vehicle positioning estimation skill 2.3 Identifying workshop signs and markings
3. Park and stop the vehicle	3.1 Vehicle is positioned according to ***parking rules and regulations***.	3.1 Vehicle parts, components and functions 3.2 Inspection procedures	31 Vehicle positioning estimation skills

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	3.2 Parking brake is engaged according to industry practice. 3.3 ***Electrical devices*** are turned off based on manufacturer's specification. 3.4 Vehicle is shut-off following owner's manual.	3.3 Owner's Manual 3.4 Procedure in shutting-off vehicle 3.5 Safety procedures 3.6 Parking rules and regulations	3.2 Identifying parking signs and markings

RANGE OF VARIABLES

VARIABLE	RANGE
1. Multi point inspection	May include: 1.1 Check for any obstruction 1.2 Check external condition 1.3 Check internal condition 1.3.1 Manual transmission 1.3.2 Automatic transmission 1.4 Check vehicle drivability
2. Cockpit Drill	May include: 2.1 Car mirror adjustments 2.2 Steering the car 2.3 How to change gears 2.4 Use of parking brake 2.5 Doors, Seat, Steering, Seat belt and Mirrors 2.6 Foot controls 2.7 Hand controls 2.8 Auxiliary controls (indicators)
3. Workshop hazards	May include: 3.1 Workshop tools and materials 3.2 Workshop equipment 3.3 Other vehicles 3.4 Other people 3.5 Oil spills 3.6 Loose parts
4. Parking rules and regulation	May include: 4.1 Parallel parking 4.2 Horizontal parking 4.3 Park facing the wall
5. Electrical devices	May include: 5.1 Lights 5.2 Air conditioning 5.3 Wiper 5.4 Radio

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared vehicle for operation 1.2 Positioned the vehicle 1.3 Parked and stopped the vehicle 1.4 Used owner's manual
2. Resource implication	The following resources MUST be provided: 2.1 Workshop range/area 2.2 Service working bay 2.3 Appropriate vehicle for moving and positioning 2.4 Owner's manual
3. Method of assessment	Competency MUST be assessed through: 3.1 Demonstration with oral questioning 3.2 Written exam 3.3 Interview 3.4 Direct observation
4. Context of assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

UNIT OF COMPETENCY : UTILIZE AUTOMOTIVE TOOLS

UNIT CODE : ALT723214

UNIT DESCRIPTOR : This unit covers the knowledge and skills in selecting and using automotive power tools, hand tools and tool keeping.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare automotive tools	1.1 ***Automotive tools*** are identified according to their classification and specification. 1.2 ***Automotive tools and attachments*** are selected according to job requirements. 1.3 ***Automotive tools and attachments*** are inspected for ***defects and damages*** according to manufacturers and work place procedures. 1.4 Safety practices are applied following OSHS.	1.1 Understanding power to size ratio 1.2 Leverage 1.3 Types of power tools and hand tools 1.4 Uses of automotive power tools and hand tools 1.5 Defects and damages of automotive tools and attachments 1.6 Handling of tools 1.7 Interpretation of contents of users manuals 1.8 Safety procedures 1.9 Wearing of PPE	1.1 Identifying defects or damages of tools before use 1.2 Knowledgeable in proper handling of tools 1.3 Identifying tools required for the job 1.4 Inspecting the area were power tools will be use
2. Use automotive tools	2.1 ***Attachments*** are mounted to ***automotive tools*** according to job requirements. 2.2 Power tools are connected to ***power sources*** according to operation's manual. 2.3 Power tools are operated according to operation's manual. 2.4 ***Hand tools*** are utilized according to operation's manual.	2.1 Use of automotive tools 2.2 Application of Torque and pressure 2.3 Unit conversion of torque 2.4 English and metric system 2.5 Types of hand tools 2.6 Types of power tools 2.7 Fundamentals of automotive hand tools and power tools	2.1 Analytical skills 2.2 Technical literacy 2.3 Mounting attachments to automotive tools 2.4 Connecting power tools to power sources 2.5 Operating power tools 2.6 Utilizing hand tools 2.7 Wearing PPEs 2.8 Applying safety practices

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.5 ***PPEs*** are worn in accordance to OSHS.	2.8 Interpretation of contents of users manuals 2.9 OSHS 2.10 Resources information 2.10.1 Bulletin 2.10.2 Shop manual	2.9 Following manuals
3. Maintain automotive tools	3.1 ***Automotive tools and attachments*** are cleaned according to user's manual. 3.2 ***Automotive tools and attachments*** are checked for serviceability according to workplace and manufacturers procedures. 3.3 ***Defects and damages*** are reported to immediate superior following industry standards. 3.4 ***Automotive tools and attachments*** are stored according to workplace procedures. 3.5 Safety practices are applied following OSHS. 3.6 ***Wastes*** are disposed following environmental law and regulations.	3.1 Different types of power tools and hand tools 3.2 Techniques in tool Arrangement 3.3 Fundamentals of automotive tools 3.4 Cleaning of automotive tools 3.5 Labeling and arranging of power tools and hand tools 3.6 Safety practices 3.7 Procedures in maintaining of power tools and hand tools 3.8 Tagging of damaged/ worn power tools and hand tools 3.9 Reporting damage power tools and hand tools 3.10 Proper disposal of damaged tools 3.11 Proper disposal of chemicals used for cleaning 3.12 OSHS 3.13 Environmental law and regulations 3.14 5S of good housekeeping 3.15 3Rs	3.1 Sorting of tools 3.2 Skills in creating reports 3.3 Cleaning of tools 3.4 Checking, cleaning and storing automotive tools and attachments 3.5 Reporting defects and damages 3.6 Disposing wastes 3.7 Practicing safety procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Automotive tools	May include: 1.1 Power tools 1.1.1 Electric power tools 1.1.1.1 Electric drill 1.1.2 Pneumatic tools 1.2 Basic tools 1.3 Special service tools (SST)
2. Power sources	May include: 2.1 Electric source 2.2 Pneumatic or air 2.3 Hydraulic
3. Basic tools	May include: 3.1 Wrenches 3.2 Pliers 3.3 Screw drivers 3.4 Power handle 3.5 Ratchet 3.6 Multitester 3.7 Flash light 3.8 Rubber mallet 3.9 Hammer 3.10 Jack 3.11 Jack stand 3.12 Choke
4. Attachments	May include: 4.1 Bits 4.2 Sockets 4.3 Extension
5. Defects and damages	May include: 5.1 Tools 5.1.1 Cracks 5.1.2 Breakage 5.1.3 Deformity 5.1.4 Looseness 5.1.5 Corrosions 5.1.6 Leaks 5.2 Attachments 5.2.1 Cracks 5.2.2 Breakage 5.2.3 Deformity 5.2.4 Looseness 5.2.5 Corrosions
6. Personal protective equipment (PPEs)	May include: 6.1 Goggles 6.2 Gloves 6.3 Hard hat

VARIABLE	RANGE
	6.4 Safety shoes 6.5 Dust mask
7. Wastes	May include: 7.1 Dead batteries 7.2 Deformed, cracked, broken bits/sockets/extensions 7.3 Used cleaning chemicals 7.4 Used oil 7.5 Contaminated cleaning materials

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment require evidence that the candidate understands the applications and guidelines specified by the manufacturer. 1.1 Prepared automotive tools 1.2 Used Power tools 1.3 Used Hand tools 1.4 Maintained and stored automotive tools 1.5 Disposed wastes 1.6 Applied safety measures
2. Resource implication	The following resource MUST be provided: 2.1 Appropriate power tools and hand tools 2.2 Tools and materials relevant for training 2.3 Proper place for storage and disposal 2.4 Work shop manuals
3. Method of assessment	Competency MUST be assessed through: 3.1 Written examination 3.2 Demonstrations with oral questioning 3.3 Direct observation 3.4 Third party report 3.5 Interview
4. Context of assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution

UNIT OF COMPETENCY : PERFORM MENSURATION AND CALCULATION

UNIT CODE : ALT723215

UNIT DESCRIPTOR : This unit covers the knowledge and skills on how to use automotive measuring tools.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Select measuring instruments	1.1 Component to be measured is identified based on job requirements. 1.2 ***Automotive measuring instrument*** is identified based on job requirements. 1.3 Correct specifications are obtained from repair manual. 1.4 Measuring tools are calibrated in line with job requirements. 1.5 Measuring instruments are checked for accuracy and adjusted according to manufacturer's manual. 1.6 Defective measuring instruments are reported and returned to toolkeeper following industry standards. 1.7 Safety practices are applied following OSHS.	1.1 Category of measuring instruments 1.2 Types and uses of measuring instruments 1.3 Shapes and Dimensions 1.4 Use of user's manual 1.5 Workshop procedures in reporting defective instruments 1.6 Characteristics of defective measuring instruments 1.7 Procedure in preparing report 1.8 OSHS in calibrating measuring instruments 1.9 Calibration of measuring tools 1.10 Inspection of measuring tools 1.11 Segregation and reporting of defective measuring instruments	1.1 Identifying and selecting measuring instruments 1.2 Visualizing objects and shapes 1.3 Calibration skills 1.4 Identifying defective measuring instruments 1.5 Reporting skills 1.6 Applying safety practices 1.7 Obtaining correct specifications 1.8 Checking measuring instruments for accuracy 1.9 Reporting and segregating defective measuring instruments
2. Carry out measurements and calculation	2.1 ***Automotive measuring instrument*** is selected to achieve required outcome in	2.1 Formulas for volume, areas, perimeters of plane and geometric figures	2.1 Performing calculation 2.2 Applying formulas for volume, areas, perimeters of

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	line with job requirements. 2.2 Accurate measurements are obtained in line with job requirements. 2.3 ***Calculation*** needed to complete work tasks are performed using ***mathematical operations***. 2.4 Numerical computation is self-checked and corrected for accuracy following manufacturer's workshop manual. 2.3 Tools' limit of accuracy are read following manufacturer's workshop manual. 2.4 Report is submitted to immediate supervisor following industry standard operating procedure. 2.5 Safety practices are applied following OSHS.	2.2 Different automotive measuring instruments 2.3 Calculation & measurement 2.4 Four fundamental operation 2.5 Linear measurement 2.6 Dimensions 2.7 Unit conversion 2.8 Ratio and proportion 2.9 Handling of measuring instruments 2.10 Tools' limit of accuracy 2.11 OSHS 2.12 PPEs	plane and geometric figures 2.3 Handling measuring instruments 2.4 Selecting automotive measuring instruments 2.5 Obtaining accurate measurements 2.6 Performing calculation 2.7 Self-checking and correcting numerical computation 2.8 Reading tools' limit of accuracy 2.9 Applying OSHS 2.10 Wearing of PPEs
3. Maintain measuring instruments	3.1 Measuring instruments are handled following manufacturer's manual. 3.2 Measuring instruments are cleaned following manufacturer's manual. 3.3 Instruments are stored according to manufacturer's specifications and standard operating procedures.	3.1 Types of measuring instruments and their uses 3.2 Safe handling procedures in using measuring instruments 3.3 Four fundamental operation of mathematics 3.4 Formula for volume, area, perimeter and other geometric figures	3.1 Handling and maintaining measuring instruments 3.2 Disposing wastes 3.3 Practicing good housekeeping 3.4 Applying safety practices

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	3.4 Safety practices are applied.	3.5 5S of good housekeeping 3.6 Waste management 3.7 Storing of measuring instruments 3.8 OSHS	

RANGE OF VARIABLES

VARIABLE	RANGE
1. Automotive measuring instruments	May include: 1.1 Torque wrench 1.2 Vernier caliper 1.3 Micrometer (inside and outside) 1.4 Dial gauge 1.5 Feeler gauge 1.7 Pitch/thread gauge 1.8 Multi-tester (analog/digital) 1.9 Vacuum Gauge 1.10 Tire depth gauge 1.11 Battery tester 1.12 Steel tape 1.13 Ruler
2. Calculation	May include: 2.1 Volume 2.2 Area 2.3 Displacement 2.4 Inside diameter 2.5 Circumference 2.6 Length 2.7 Thickness 2.8 Outside diameter 2.9 Taper 2.10 Out of roundness 2.11 Voltage 2.12 Resistance 2.13 Current 2.14 Pressure 2.15 Clearance 2.16 Distortion/run-out 2.17 Torque conversion 2.18 Temperature
3. Mathematical operations	Includes: 3.1 Addition 3.2 Subtraction 3.3 Multiplication 3.4 Division 3.5 Fractions 3.6 Percentages 3.7 Mixed numbers

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate perform the following: 1.1 Selected measuring instruments 1.2 Performed measurements and calculation 1.3 Maintained measuring instruments 1.4 Applied safety practices
2. Resource implications	The following resources MUST be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate Automotive Measuring Tools & equipment 2.3 Materials relevant to the activity 2.4 Training vehicle or simulators 2.5 User's manual 2.6 Repair manual
3. Method of assessment	Competency MUST be assessed through: 3.1 Written exam 3.2 Demonstration with oral questioning 3.3 Third party report 3.4 Interview
4. Context of assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

UNIT OF COMPETENCY : UTILIZE WORKSHOP FACILITIES AND EQUIPMENT

UNIT CODE : ALT723216

UNIT DESCRIPTOR : This unit deals with inspecting and cleaning of work area including tools, equipment and facilities. Storage of equipment, including operating of basic workshop equipment.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Perform pre-operation activities	1.1 ***Workshop facilities*** are prepared according to work requirements. 1.2 ***Equipment*** are prepared according to work requirements. 1.3 ***Equipment*** are calibrated following users' manual. 1.4 ***Minor repairs*** are carried out based on users' ***manual***. 1.5 Defective equipment are reported to immediate supervisor following company procedures. 1.6 Safety practices are applied following OSHS.	1.1 Different areas of an automotive service facilities 1.2 Preparation procedures of automotive service facilities 1.3 Different equipment in the automotive service facilities 1.4 Preparation procedures of automotive equipment 1.5 Minor repairs of automotive equipment 1.6 Report of defective equipment 1.7 Reporting procedures for defective equipment 1.8 OSHS practices related to the preparation of facilities and equipment 1.9 Workshop facilities and equipment	1.1 Preparing work area 1.2 Preparing equipment 1.3 Calibrating equipment 1.4 Repairing minor equipment issues 1.5 Reporting defective equipment 1.6 Applying safety practice 1.7 Following manuals

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Use facilities and equipment	2.1 Equipment is operated according to operation ***manual***. 2.2 Facilities are utilized according to workshop procedures. 2.3 Equipment performance is monitored following users' ***manual***. 2.4 Facilities functionalities are monitored following workplace procedures. 2.5 Safety practices are applied following OSHS.	2.1 Operate Equipment 2.2 Identify facilities required for task 2.3 Evaluate equipment operation 2.4 Inspect facility functionalities 2.5 OSHS practices related to operation of facilities and equipment 2.6 Manuals in utilizing facility and equipment 2.7 Monitoring procedure of equipment's performance 2.8 Evaluate equipment operation 2.9 Inspection of facility functionalities	2.1 Operating equipment 2.2 Utilizing facility 2.3 Monitoring equipment performance 2.4 Monitoring functionalities of facility 2.5 Practicing safety 2.6 Following manual
3. Conduct post-operation activities	3.1 Workshop facilities are restored according to 5S of good housekeeping. 3.2 ***Equipment*** are cleaned and stored according to good housekeeping. 3.3 Wastes are disposed following waste management procedure and OSHS. 3.4 ***PPEs*** and Safety practices are applied following OSHS. 3.5 Report is prepared based on workshop procedure.	3.1 5S of Good housekeeping 3.2 3Rs/ Waste segregation and disposal 3.3 Restoration of the facilities 3.4 Maintenance and storage of Equipment 3.5 OSHS 3.6 Preparation of report	3.1 Restoring workshop facilities properly 3.2 Cleaning Equipment 3.3 Storing equipment in proper location 3.4 Disposing waste materials 3.5 Reporting facilities and equipment condition 3.6 Practicing safety 3.7 Practicing 5S and 3Rs

RANGE OF VARIABLES

VARIABLE	RANGE
1. Equipment	May include: 1.1 Lifter (Two Post Lifter / Four Post Lifter/ Scissor type) 1.2 Crocodile Jack 1.3 Jack Stand 1.4 Air Compressor 1.5 Oil drain
2. Workshop facilities	May include: 2.1 Service Stall / Working Bay / Workshop areas for servicing/repairing light and/or heavy vehicle and/or plant transmissions and/or outdoor power equipment 2.2 Overhauling Room 2.3 Electrical / Air-con Room 2.4 Inspection Area 2.5 Open workshop/garage and enclosed, ventilated office area 2.6 Car wash area 2.7 Other variables may include workshop with: 2.7.1 Mess hall 2.7.2 Wash room 2.7.3 Comfort room 2.7.4 Storage Room 2.7.5 Training Room
3. Manuals	May include: 3.1 Vehicle/plant manufacturer specifications 3.2 Company operating procedures 3.3 Industry/Workplace Codes of Practice 3.4 Product manufacturer specifications 3.5 Industry Occupational Health &Safety 3.6 Equipment Operation Guidelines 3.7 Service/workshop/repair manual
4. PPEs	May include: 4.1 Gloves 4.2 Apron 4.3 Goggles 4.4 Safety shoes 4.5 Uniforms 4.6 Cap 4.7 Safety helmet
5. Minor repairs	May include: 5.1 Lubrication 5.2 Bolt tightening 5.3 Worn-out parts replacement

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Performed pre-operation activities 1.2 Used facilities and equipment 1.3 Conducted post-operation activities 1.4 Applied safety practices and good housekeeping 1.5 Disposed wastes
2. Resource implications	The following resources should be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate Equipment 2.3 Materials relevant to the activity 2.4 Manuals/references 2.5 PPEs 2.6 Fire Extinguishers
3. Method of assessment	Competency in this unit may be assessed through: 3.1 Written exam 3.2 Demonstration with oral questioning 3.3 Direct observation
4. Context of assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

UNIT OF COMPETENCY : PREPARE SERVICING PARTS AND CONSUMABLES

UNIT CODE : ALT723217

UNIT DESCRIPTOR : This unit of competency covers the ability to prepare parts and consumables for gasoline and diesel engines in conducting preventive maintenance.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify parts and consumables	1.1 ***Parts and consumables*** are ***determined*** according to job requirements. 1.2 Availability of parts and consumables are confirmed based on stock. 1.3 ***Indirect materials*** are identified according to job requirements. 1.4 ***Hazardous parts and consumables*** are identified according International standards. 1.5 Safety practices are applied according to OSHS.	1.1 Job requirements 1.2 Safety practices 1.3 Understanding manuals 1.4 Hazardous parts and consumables 1.5 Solid waste management act (RA 6969) 1.6 Wearing of PPE's 1.7 OSHS 1.8 Proper storage of materials 1.9 Chemical contents of consumables 1.10 Composition of consumables 1.11 Quality of parts and consumables 1.12 Computation for quantity of parts and consumables 1.13 Vehicle specifications 1.14 Identifying Part no. 1.15 Awareness in part number 1.16 Updated type of parts and consumables	1.1 Determining parts and consumables 1.2 Reading and interpreting job requirements 1.3 Identifying required parts & consumables 1.4 Understanding safety practices 1.5 Determining quantity and quality of parts and consumables 1.6 Confirming availability of parts and consumables 1.7 Identifying indirect materials 1.8 Identifying hazardous parts and consumables 1.9 Applying safety practices 1.10 Understanding safety practices 1.11 Following manuals
2. Retrieve and withdraw parts and consumables	2.1 Requisition slip is prepared according to identified parts and consumables.	2.1 Job requirements 2.2 Safety practices 2.3 Understanding manuals	2.1 Reading and interpreting requisition slip

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.2 Withdrawal of parts and materials are recorded. 2.3 Quantity of parts and consumables are validated according to job requirements. 2.4 Parts and materials are handled following safety procedures.	2.4 Hazardous parts and consumables 2.5 Solid waste management act (RA 6969) 2.6 Wearing of PPE's 2.7 Updated types of parts & consumables for proper usage	2.2 Validating quantity of parts and materials 2.3 Handling parts and consumables
3. Complete work process	3.1 Used parts and consumables are labeled and segregated. 3.2 Used parts are packed and returned to customers. 3.3 Consumables are collected for recycling. 3.4 PPEs are worn following OSHS. 3.5 ***Wastes*** are disposed according to RA 6969.	3.1 Labeling and segregation of used parts and consumables 3.2 Job requirements 3.3 Safety practices 3.4 3Rs 3.5 Solid waste management act (RA 6969) 3.6 Wearing of PPE's	3.1 Waste segregation and disposal of parts & consumables according to RA 6969

RANGE OF VARIABLES

VARIABLE	RANGE
1. Parts and consumables	May include: 1.1 Engine oil 1.2 Clutch fluid 1.3 Transmission oil 1.4 Differential oil 1.5 Power steering fluid 1.6 Brake fluid 1.7 Engine coolant 1.8 Engine oil filter 1.9 Fuel filter 1.10 Air cleaner element 1.11 Feed pump strainer 1.12 Sparkplugs (Gasoline engine) 1.13 Battery 1.14 Air cleaner 1.15 Tire 1.16 Wiper blade 1.17 A/C pollen filter 1.18 Bulb 1.19 Brake pad/brake shoe 1.20 Clutch lining
2. Determining parts and consumables	May include: 2.1 Quantity 2.2 Quality
3. Indirect materials	May include: 3.1 Rags 3.2 Saw dust 3.3 Cleaning fluids 3.4 Sand paper
4. Hazardous parts consumables	May include: 4.1 Batteries 4.2 Used oil 4.3 Used fluids 4.4 Used coolant 4.5 Used parts 4.6 Used oil filter
5. Wastes	May include: 5.1 Contaminated consumables 5.2 Contaminated parts

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified parts and consumables 1.2 Retrieved and withdrawn parts and consumables 1.3 Completed work process 1.4 Applied safety practices
2. Resource implications	The following resources should be provided: 2.1 Workplace: Real or simulated work area 2.2 Materials relevant to the activity 2.3 Repair manuals and related reference materials
3. Method of assessment	Competency in this unit may be assessed through: 3.1 Direct observation 3.2 Interview 3.3 Written examination 3.4 Demonstration with oral questioning 3.5 Third party report
4. Context of Assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

UNIT OF COMPETENCY : PREPARE VEHICLE FOR SERVICING AND RELEASING

UNIT CODE : ALT723218

UNIT DESCRIPTOR : This unit covers the knowledge, skills, and attitudes needed in identifying and preparing the vehicle for servicing and releasing.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Receive vehicle	1.1 Vehicle is located following company standard. 1.2 Checklist is validated for exterior and interior items in accordance with ***vehicle checklist***. 1.3 Job Order is checked for proper assignment according to ***work classification***. 1.4 ***Work bay*** for vehicle is designated based from Job Order. 1.5 Vehicle is moved on the designated ***work bay***.	1.1 Identification of basic vehicle components 1.2 Types of defects 1.3 Read & understand Job Order 1.4 Flat rate time 1.5 Use of PPEs 1.6 Adherence to safety procedures 1.7 Vehicle checklist 1.8 Work classification 1.9 Work bay 1.10 Attitudes 1.10.1 Patient 1.10.2 Attention to details 1.10.3 Honest 1.10.4 Time Conscious	1.1 Completing vehicle checklist 1.2 Classifying work to be performed 1.3 Assigning work bay 1.4 Validating checklist for exterior and interior items 1.5 Checking job order for proper assignment 1.6 Identifying vehicle 1.7 Moving vehicle to designated work bay
2. Prepare vehicle for servicing	2.1 ***Protective covers*** are installed prior to servicing based on workshop operating standards. 2.2 Vehicle is positioned and set-up for lifting according to repair order. 2.3 Vehicle is lifted for servicing following manufacturer's manual.	2.1 Familiarization on equipment & facilities 2.2 Time estimation of completion 2.3 Vehicle tagging 2.4 Types of protective covers 2.5 Setting-up of vehicle for lifting 2.6 Read & understand repair order 2.7 Use of PPEs 2.8 Use of safety gears	2.1 Understanding of vehicle status 2.2 Installation of protective covers 2.3 Positioning vehicle 2.4 Operating lifter 2.5 Moving vehicle 2.6 Setting-up vehicle for lifting 2.7 Practicing safety

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.4 Safety practices are applied following safety procedures.	2.9 OSHS 2.10 Adherence to safety procedures 2.11Attitudes: 2.11.1 Patient 2.11.2 Attention to details 2.11.3 Honest 2.11.4 Time Conscious	
3. Prepare vehicle for releasing	3.1 Job done is confirmed according to repair order. 3.2 Quality check is done based from repair order. 3.3 Transfer of vehicle to wash bay is coordinated according to SOP. 3.3 Vehicle is endorsed to quality control person following workplace procedure.	3.1 Familiarization of equipment & facilities 3.2 Read & understand repair order 3.3 Confirmation of job done 3.4 Quality standards checking 3.5 Coordination of transferring vehicle 3.6 Endorsement procedures for vehicle 3.7 Attitudes 3.7.1 Patient 3.7.2 Attention to details 3.7.3 Honest 3.7.4 Time Conscious	3.1 Confirming job done 3.2 Performing quality checking 3.3 Coordinating transfer of vehicle to wash bay 3.4 Endorsing and turning-over vehicle

RANGE OF VARIABLES

VARIABLE	RANGE
1. Vehicle checklist	May include: 1.1 External scratches, accessories, items, dents, damages and cracks 1.2 Internal items, scratches, noticeable damages, including spare tire, tools, and loose items 1.3 Standard items that are not present during inspection 1.4 Valuable/personal belongings
2. Work classification	May include: 2.1 Body and Paint repair 2.2 General Job repair 2.3 Periodic maintenance service (PMS)
3. Work bay	May include: 3.1 Service Stall / Working Bay / Workshop areas for servicing/repairing light and/or heavy vehicle and/or plant transmissions and/or outdoor power equipment 3.2 Overhauling Room 3.3 Electrical / Air-con Room 3.4 Inspection Area 3.5 Open workshop/garage and enclosed, ventilated office area
5. Protective covers	May include but not limited to: 5.1 Seat Cover 5.2 Steering Wheel Cover 5.3 Handbrake Cover 5.4 Shift Knob Cover 5.5 Fender Cover 5.6 Paper mat

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Received vehicle 1.2 Prepared vehicle for servicing 1.3 Prepared vehicle for releasing 1.4 Applied safety practices
2. Resource implications	The following resources MUST be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate Tools & Equipment 2.3 Materials relevant to the activity 2.4 Manuals and references
3. Method of assessment	Competency may be assessed through: 3.1 Direct observation 3.2 Demonstration with Oral questioning 3.3 Interview 3.4 Written Evaluation 3.5 Third Party Report
4. Context of assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

CORE COMPETENCY

UNIT OF COMPETENCY : SERVICE MANUAL AIR-CONDITIONER SYSTEM

UNIT CODE : ALT723392

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to inspect and service the manual air-conditioner system.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare to inspect and service manual air-conditioner system	1.1 ***Job requirements*** are determined from workplace instructions. 1.2 Servicing information is sourced and interpreted following ***industry criteria***. 1.3 Hazards associated with the work are identified and risks are managed. 1.4 ***Tools, equipment, and materials*** are selected and checked for serviceability. 1.5 Defective and damaged tools and equipment are reported following workplace procedures. 1.6 Availability of materials are checked and reported following workplace procedures. 1.7 Safety practices are applied following OSHS.	1.1 OSHS 1.2 Waste management 1.3 Industry criteria 1.4 Sourcing out and interpretation of servicing information 1.5 Service/Repair manual 1.6 Tools, equipment and materials in inspecting and servicing manual air-conditioning system 1.7 Job requirements 1.8 Serviceability of tools and equipment 1.9 Work hazards	1.1 Interpreting job requirements from workplace instructions 1.2 Clarifying instructions 1.3 Locating appropriate sources of information 1.4 Selecting and checking tools and equipment 1.5 Reporting defective and damaged tools and equipment 1.6 Checking and reporting the availability of materials 1.7 Applying safety practices
2. Service manual air-conditioner system and components	2.1 System is visually checked following industry procedure.	2.1 Identification and function of manual air-	2.1 Locating appropriate sources of

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.2 ***System performance tests*** are carried out according to industry criteria. 2.3 Manual air-conditioning system is ***serviced*** according to industry criteria. 2.4 ***Post-service testing*** is carried out according to workplace procedures. 2.5 Findings are reported according to workplace procedures. 2.6 Safety practices are applied following Occupational Health and Safety (OSH) procedure.	conditioning system and components including: 2.1.1 Compressor 2.1.2 Condenser 2.1.3 Receiver-dryer 2.1.4 Expansion valve 2.1.5 Evaporator 2.1.6 Blower fan 2.2 Arithmetic operation 2.3 Reading manifold gauge 2.4 Industry criteria 2.5 Operation of tools, equipment and materials in inspecting and servicing manual air-conditioning system 2.6 Greenhouse Gasses 2.7 Inspection procedures for manual air-conditioner system 2.8 System performance tests 2.9 Servicing of manual air-conditioning system 2.10Post-service testing 2.11 Service/Repair manual 2.12 Procedure in accomplishing checklists 2.13 Job done 2.14 OSHS 2.15 Wearing of PPEs 2.16. Health protocols issued by government on prevention on	information efficiently. 2.2 Interpreting information from manufacturer and workshop literature 2.3 Measuring temperatures and pressures, and using basic mathematical operations, including addition and subtraction, to calculate deviations from manufacturer specifications. 2.4 Visual checking of system 2.5 Conducting system performance tests 2.6 Servicing manual air-conditioning system 2.7 Performing post-service testing 2.8 Reporting findings 2.9 Applying safety practices 2.10 Operating tools and materials 2.11 Operating recovery machine

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		spread of and protection from infectious disease in the workplace 2.17 Attitude: ▪ Patient ▪ Attention to details ▪ Time conscious ▪ Honest	
3. Complete work processes	3.1 Final inspection is made based on workplace procedure. 3.2 Vehicle is turned-over to immediate superior for quality control following workplace procedure. 3.3 Work area is restored following 5S of good housekeeping. 3.4 Wastes are managed following environmental rules and regulations. 3.5 Tools and equipment are checked and stored according to workplace procedures. 3.6 ***Workplace documents*** are accomplished according to workplace procedures.	3.1 Final inspection procedure 3.2 Turn-over of vehicle 3.3 Accomplishment of repair order and other forms ▪ Job done 3.5 OSHS 3.6 Wearing of PPEs 3.8 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 3.8 3Rs 3.9 5S 3.10 Waste management 3.11 Checking and storage of tools and equipment 3.12 Workplace documents 3.13 Final inspection procedures	3.1 Filling-out workplace documentation parts and material used. 3.2 Reporting inspection findings and make repair recommendations 3.3 Conducting final inspection 3.4 Performing vehicle turn-over 3.5 Restoring work area 3.6 Managing wastes 3.7 Checking and storing tools and equipment 3.8 Wearing of PPEs 3.9 Applying safety practices

RANGE OF VARIABLES

VARIABLE	RANGE
1. Job requirements	May include: 1.1 Cleaning or replacement A/C filter 1.2 Cleaning of evaporator 1.3 Cleaning of condenser 1.4 Changing of compressor oil 1.5 Replacement of expansion valve 1.6 Replacement of receiver-dryer 1.7 Replacement O-rings 1.8 Replacement of flexible hoses 1.9 Removal and installation of dashboard panel
2. Industry criteria	May include: 2.1 Manufacturer specifications 2.2 Repair manual 2.3 Workplace procedures 2.4 Safety and environmental requirements 2.5 Service history
3. Tools and equipment	May include: 3.1 Tools 3.1.1 Basic hand tools 3.1.2 Straight hexagon wrench 3.1.3 Torque wrench (Required torque 100kg cm) 3.1.4 Feeler gauge 3.1.5 Service type thermometer 3.2 Equipment 3.2.1 Recovery and recycling machine 3.2.2 Manifold charging gauge with hose 3.2.3 Halogen leak detector 3.2.4 Refrigerant identifier 3.2.5 Hygrometer 3.2.6 Pressure washer 3.2.7 Vacuum pump 3.2.8 Service lamp 3.3 Materials 3.3.1 O- ring 3.3.2 Rags 3.3.3 Refrigerant 3.3.4 Compressor oil 3.3.5 Shaft seal 3.3.6 Nitrogen gas 3.3.7 Desiccant materials 3.3.8 Butil tape 3.3.9 PPEs ▪ Face mask ▪ Face shield ▪ Goggles ▪ Gloves

VARIABLE	RANGE
	▪ Coverall suit ▪ Safety shoes 3.3.10 Cleaning agent ▪ Brush ▪ Cleaning solutions 3.3.11 Car protective equipment (CPE) 3.3.12 Insulation tape
4. System performance tests	May include: 4.1 Checking of cooling performance 4.2 Checking of refrigerant pressure 4.3 Checking of refrigerant leak 4.4 Checking of blower operation 4.5 Checking of air-con panel control 4.6 Checking of auxiliary fan operation 4.7 Inspection of magnetic clutch
5. Servicing of manual air-conditioning system	May include: 5.1 Cleaning of evaporator 5.2 Cleaning of condenser 5.3 Replacement of AC filter 5.4 Recovery, recycling and charging of refrigerant 5.5 Replacement of receiver-dryer 5.6 Pressure leak testing
6. Post-service testing	Includes: 6.1 Inspect refrigerant with manifold gauge 6.2 Check for refrigerant leakage 6.3 Check blower operation 6.4 Check condenser fan operation 6.5 Check temperature control switch operation 6.6 Check cooling performance 6.7 Check for unusual noise and vibration
7. Workplace documents	May include: 7.1 Job order 7.2 Repair order 7.3 Inspection form 7.4 Diagnostic sheet

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared to inspect and service manual air-conditioner system. 1.1.1 Determined job requirements. 1.1.2 Sourced and interpreted servicing information. 1.1.3 Identified hazards associated with the work are and managed risks. 1.1.4 Selected and checked tools, equipment, and materials. 1.1.5 Reported defective and damaged tools and equipment. 1.1.6 Checked and reported availability of materials. 1.1.7 Applied safety practices. 1.2 Serviced manual air-conditioner system and components. 1.2.1 Visually checked system. 1.2.2 Carried out system performance tests. 1.2.3 Serviced manual air-conditioning system. 1.2.4 Carried out post-service testing. 1.2.5 Reported findings. 1.2.6 Applied safety practices. 1.3 Completed work processes. 1.3.1 Made final inspection. 1.3.2 Turned-over vehicle. 1.3.3 Restored work area. 1.3.4 Managed wastes. 1.3.5 Checked and stored tools and equipment. 1.3.6 Accomplished workplace documents.
2. Resource implications	The following resources MUST be provided: 2.1 Workplace: Real or simulated work area 2.2 Tools, materials, and equipment relevant to perform required tasks 2.3 Manufacturer's repair manual 2.4 PPEs 2.5 Training vehicle 2.6 First aid kit
3. Method of assessment	Competency in this unit may be assessed through: 3.1 Demonstration with Oral questioning 3.2 Written exam 3.3 Direct Observation
4. Context for assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : DIAGNOSE AND REPAIR MANUAL AIR-CONDITIONER SYSTEM

UNIT CODE : ALT723393

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to diagnose and repair the manual air-conditioner system.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare to diagnose and repair manual air conditioning system	1.1 ***Job requirements*** are determined from workplace instructions. 1.2 Diagnostic information is sourced and interpreted following ***industry criteria***. 1.3 Hazards associated with the work are identified and risks are managed. 1.4 ***Diagnostic and repair tools and equipment*** are selected and checked for serviceability. 1.5 Defective and damaged tools and equipment are reported following workplace procedures. 1.6 Availability of ***materials*** are checked and reported following workplace procedures. 1.7 Safety practices are applied following OSHS.	1.1 OSHS 1.2 Sourcing out and interpretation of diagnostic information 1.3 Electrical principles 1.3.1 Current, voltage, resistance and power 1.4 Series circuits 1.5 Parallel circuits 1.6 Series parallel circuits 1.7 Ohm's law 1.8 Diagnostic tests 1.9 Faults and its causes 1.10 Electrical troubleshooting guide 1.11 Service/Repair manual 1.12 Tools in diagnosing air-conditioning system 1.13 Interpretation of job requirements 1.14 Different job requirements 1.15 Serviceability of tools 1.16 Repair manual 1.17 Work hazards	1.1 Interpreting job requirements from workplace instructions 1.2 Clarifying instructions 1.3 Locating appropriate sources of information 1.4 Selecting and checking diagnostic and repair tools and gauges 1.5 Reporting defective and damaged tools and equipment 1.6 Checking and reporting availability of materials 1.7 Applying safety practices

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		1.18 Materials in diagnosing air-conditioner	
2. Diagnose manual air conditioning system	2.1 Troubleshooting is performed using troubleshooting guide in the repair manual. 2.2 ***Diagnostic tests*** are carried out according to industry criteria. 2.3 Faults and its causes are identified based on troubleshooting guide. 2.4 Findings are reported according to industry criteria. 2.5 Checklist is accomplished following industry criteria. 2.6 Safety practices are applied following Occupational Health and Safety (OSH) procedure.	2.1 Heat transfer principles, including convection, conduction and radiation 2.2 Theory on Pressure 2.3 Refrigerants 2.4 Compressor oils 2.5 Mensuration 2.6 Functions of the following air conditioning components: 2.6.1 Compressor 2.6.2 Condenser 2.6.3 Receiver-drier 2.6.4 Evaporator 2.6.5 Blower fan 2.6.6 Refrigerant 2.7 Diagnostic tests 2.8 Faults and its causes 2.9 Troubleshooting guide 2.10 Industry criteria 2.11 Troubleshooting procedures of manual air-condition 2.12 Procedure in accomplishing checklists 2.13 OSHS 2.14 Wearing of PPEs 2.15 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace	2.1 Interpreting information from manufacturer and workshop literature. 2.2 Measuring temperatures and pressures, and using basic mathematical operations, including addition and subtraction, to calculate deviations from manufacturer specifications 2.3 Troubleshooting manual air-conditioning system 2.4 Conducting diagnostic tests 2.5 Identifying faults and its causes 2.6 Reporting findings 2.7 Accomplishing checklist 2.8 Applying safety practices

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		2.16 Attitude: 2.15.1 Patient 2.15.2 Attention to details 2.15.3 Time conscious 2.15.4 Honest	
3. Repair manual air conditioning system	3.1 Repair information is sourced and interpreted. 3.2 Repairs and ***component*** replacements and adjustments are carried out according to industry criteria. 3.3 System is filled with compressor oil and charged with the appropriate refrigerant according to manufacturer specifications and workplace procedures. 3.4 ***Post- repair testing*** is carried out according to workplace procedures. 3.5 Safety practices are applied following OSHS.	3.1 Repair information 3.2 Industry criteria 3.3 Recharging system 3.4 Recycling and recovering of refrigerant 3.5 Cooling temperature 3.6 Repairs and component replacement and adjustment 3.7 Post-repair testing 3.8 Repair and component replacement and adjustment 3.9 Procedure in accomplishing checklists 3.10 OSHS 3.11 Wearing of PPEs 3.12 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 3.13 Attitude: 3.12.1 Patient 3.12.2 Attention to details 3.12.3 Time conscious 3.12.4 Honest	3.1 Interpreting information from manufacturer and workshop literature 3.2 Measuring temperatures and pressures, and using basic mathematical operations, including addition and subtraction, to calculate deviations from manufacturer specifications 3.3 Sourcing repair information 3.4 Carrying out repairs and component replacements and adjustments 3.5 Recharging system with refrigerant 3.6 Carrying out post-repair testing 3.7 Applying safety practices

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
4. Complete work processes	4.1 Final inspection is made based on workplace procedure. 4.2 Vehicle is turned-over to immediate superior for quality control following workplace procedure. 4.3 Work area is restored following 5S of good housekeeping. 4.4 Wastes are managed following environmental rules and regulations. 4.5 Tools and equipment are checked and stored according to workplace procedures. 4.6 ***Workplace documents*** are accomplished according to workplace procedures.	4.1 Accomplishment of repair order and other forms 4.2 Job done 4.3 Turn-over of vehicle 4.4 OSHS 4.5 Wearing of PPEs 4.6 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 4.6 3Rs 4.7 5S 4.8 Waste management 4.9 Checking and storage of tools and equipment 4.10 Workplace documents 4.11 Final inspection procedures	4.1 Filling out workplace documentation 4.2 Conducting final inspection 4.3 Performing vehicle turn-over 4.4 Restoring work area 4.5 Managing wastes 4.6 Checking and storing tools and equipment 4.7 Wearing of PPEs 4.8 Applying safety practices

RANGE OF VARIABLES

VARIABLE	RANGE
1. Job requirements	May include: 1.1 Diagnose insufficient cooling 1.2 Diagnose no blower operation 1.3 Diagnose air-conditioning system does not operate 1.4 Diagnose intermittent cooling 1.5 Diagnose noise and vibration 1.6 Diagnose foul odor 1.7 Diagnose cooling performance 1.8 Check leaks 1.9 Replenish refrigerant 1.10 Check motor operation, supply voltage, fuse and switches 1.11 Replace motor, switch, fuse and relay 1.12 Replace compressor 1.13 Replace magnetic clutch 1.14 Check belt condition, replace if necessary
2. Industry criteria	May include: 2.1 Manufacturer specifications 2.2 Repair/Service manual/Workplace procedures 2.3 Safety and environmental requirements 2.4 Work health and safety (WHS) and occupational health and safety (OHS) requirements, including procedures for: 2.4.1 Lifting and supporting vehicles 2.4.2 Managing and controlling grease, gear oil 2.5 Environmental requirements, procedures for trapping, storing and disposing of grease and gear oils. 2.6 Service History
3. Diagnostic and repair tools and equipment	May include: 3.1 Tools: 3.1.1 Multi-tester 3.1.2 Service Thermometer 3.1.3 Hygrometer 3.1.4 Basic hand tools 3.2 Equipment: 3.2.1 Refrigerant charging gauge with hose 3.2.2 Halogen leak detector 3.2.3 Vacuum pump 3.2.4 Recovery machine 3.2.5 Vacuum pump 3.2.6 Weighing scale 3.2.7 Graduated cylinder 3.2.8 Pressure washer 3.2.9 Service trouble lamp
4. Materials	May include:

VARIABLE	RANGE
	4.1 O- ring 4.2 Rags 4.3 Refrigerant 4.4 Compressor oil 4.5 Nitrogen gas 4.6 Insulators 4.7 Cleaning agents 4.7.1 Cleaning solution 4.7.2 Water 4.7.3 Brush 4.7.4 Soap suds 4.8 CPE
5. Diagnostic tests	May include: 5.1 Checking of temperature 5.2 Checking of initial pressure 5.3 Conducting leak test
6. Component parts	May include: 6.1 Magnetic clutch 6.2 Field coil 6.3 Evaporator 6.4 Compressor 6.5 Condenser 6.6 Condenser fan and motor 6.7 Blower fan and motor 6.8 Expansion valve 6.9 Filter dryer 6.10 Pressure switch 6.11 Pipes and hose 6.12 Drive belt 6.13 Compressor pulley 6.14 A/C control panel 6.15 Thermostat 6.16 A/C amplifier 6.17 Resistor block 6.18 Fuse and relay 6.19 Wires and connectors
7. Post repair testing	May include: 7.1 Inspect refrigerant with manifold gauge 7.2 Check for refrigerant leakage 7.3 Check blower operation 7.4 Check condenser fan operation 7.5 Check temperature control switch operation 7.6 Check cooling performance 7.7 Check bubbles on sight glass
8. Workplace documents	May include: 8.1 Job order 8.2 Repair order 8.3 Inspection form 8.4 Diagnostic sheet

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared to diagnose and repair manual air conditioning system. 1.1.1 Determined job requirements. 1.1.2 Sourced and interpreted diagnostic information. 1.1.3 Identified hazards associated with the work and managed risks. 1.1.4 Selected and checked diagnostic and repair tools and equipment. 1.1.5 Reported defective and damaged tools and equipment. 1.1.6 Checked and reported availability of materials. 1.1.7 Applied safety practices. 1.2 Diagnosed manual air conditioning system. 1.2.1 Performed troubleshooting. 1.2.2 Carried out diagnostic tests. 1.2.3 Identified faults and its causes. 1.2.4 Reported findings. 1.2.5 Accomplished checklist. 1.2.6 Applied safety practices. 1.3 Repaired manual air conditioning system. 1.3.1 Sourced and interpreted repair information. 1.3.2 Carried out repairs and component replacements and adjustments. 1.3.3 Filled system with compressor oil and charged with the appropriate refrigerant. 1.3.4 Carried out post- repair testing. 1.3.5 Applied safety practices. 1.4 Completed work processes. 1.4.1 Made final inspection. 1.4.2 Turned-over vehicle. 1.4.3 Restored work area. 1.4.4 Managed wastes. 1.4.5 Checked and stored tools and equipment. 1.4.6 Accomplished workplace documents.
2. Resource implications	The following resources MUST be provided: 2.1 Workplace: Real or simulated work area 2.2 Tools, materials, and equipment relevant to perform required tasks 2.3 Manufacturer’s repair manual 2.4 PPEs 2.5 Training vehicle 2.6 First aid kit 2.7 CPE
3. Method of assessment	Competency in this unit may be assessed through: 3.1 Demonstration with Oral questioning 3.2 Written exam 3.3 Direct Observation

4. Context for assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : REPAIR MANUAL AIR-CONDITIONER COMPRESSOR MAGENTIC CLUTCH

UNIT CODE : ALT723394

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to replace and adjust manual air-conditioner compressor.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare to repair manual air conditioner compressor magnetic clutch	1.1 ***Job requirements*** are determined from workplace instructions. 1.2 Information is sourced and interpreted following ***industry criteria***. 1.3 Hazards associated with the work are identified and risks are managed. 1.4 ***Tools*** are selected and checked for serviceability. 1.5 Defective and damaged tools are reported following workplace procedures. 1.6 Availability of ***materials*** is checked and reported. 1.7 Safety practices are applied following OSHS.	1.1 Different job requirements 1.2 Dismantling information 1.3 Dismantling tools 1.4 Industry criteria 1.5 Defects and damages of tools 1.6 Identification of hazards 1.7 Risk management 1.8 Mensuration on determining clutch disc clearance 1.9 OSHS 1.10 Waste management	1.1 Interpreting job requirements from workplace instructions 1.2 Clarifying instructions 1.3 Identifying hazards associated with work 1.4 Selecting and checking dismantling tools 1.5 Reporting Defective and damaged tools 1.6 Checking and reporting availability of materials 1.7 Managing of risk 1.8 Applying safety practices
2. Remove magnetic clutch components	2.1 Magnetic clutch is removed according to industry criteria. 2.2 Clutch components are inspected according to industry criteria. 2.3 Out of specification parts are sourced following	2.1 Sequential dismantling of magnetic clutch 2.2 Methods in inspection magnetic clutch components 2.3 Utilization of dismantling tools	2.1 Locating appropriate sources of information 2.2 Interpreting information from manufacturer and workshop literature.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	manufacturers manual. 2.4 Tools are used following industry criteria. 2.5 Safety practices are applied following OSHS.	2.4 Out of specification parts 2.5 Identification of hazards 2.6 Risk management 2.7 OSHS 2.8 Wearing of PPEs 2.9 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 2.10 Attitude: 2.9.1 Patient 2.9.2 Attention to details 2.9.3 Time conscious 2.9.4 Honest	2.3 Dismantling magnetic clutch 2.4 Inspection magnetic clutch component 2.5 Sourcing and replacing out of specification component 2.6 Using special service tools (SST) 2.7 Applying safety practice
3. Install magnetic clutch components	3.1 Magnetic clutch components are installed according to industry criteria. 3.2 Tolerances, resistances and clearances are measured following industry criteria. 3.3 Installation of magnetic clutch components is ***completed*** based on industry criteria. 3.4 ***Post-installation testing*** is carried out according to industry criteria. 3.5 Safety practices are applied following OSHS.	3.1 OSHS 3.2 Wearing of PPEs 3.3 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 3.4 3Rs 3.5 5S of Good Housekeeping 3.6 Types, characteristics and operating principles of magnetic clutch components 3.7 Tolerances, resistances and clearances of magnetic clutch components 3.8 Industry criteria	3.1 Installing magnetic clutch components 3.2 Measuring tolerances, resistances and clearances of components 3.3 Completing installation of magnetic clutch components 3.4 Carrying out post-installation testing 3.5 Applying safety practices

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		3.9 Installation procedures of magnetic clutch components 3.10 Post-installation testing 3.11 Attitude: 3.10.1 Patient 3.10.2 Attention to details 3.10.3 Time conscious 3.10.4 Honest	
4. Complete work processes	4.1 Final inspection is made based on workplace procedure. 4.2 Vehicle is turned-over to immediate superior for quality control following workplace procedure. 4.3 Work area is restored following 5S of good housekeeping. 4.4 Wastes are managed following environmental rules and regulations. 4.5 Tools are checked and stored according to workplace procedures. 4.6 ***Workplace documents*** are accomplished according to workplace procedures.	4.1 Final inspection procedure 4.2 Turn-over of vehicle 4.3 Accomplishment of repair order and other forms 4.3.1 Job done 4.4 OSHS 4.5 Wearing of PPEs 4.6 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 4.7 5S 4.8 Waste management 4.9 Checking and storage of tools 4.10 Workplace documents 4.11 Attitude: 4.11.1 Patience 4.11.2 Attention to details 4.11.3 Time conscious 4.11.4 Honest	4.1 Filling-out workplace documentation 4.2 Reporting diagnostic findings and make repair recommendations 4.3 Conducting final inspection 4.4 Performing vehicle turn-over 4.5 Restoring work area 4.6 Managing wastes 4.7 Checking and storing tools and equipment 4.8 Wearing of PPEs 4.9 Applying safety practices 4.10 Accomplishing workplace documents

RANGE OF VARIABLES

VARIABLE	RANGE
1. Job requirements	May include: 1.1 Inspect magnetic clutch 1.2 Replace magnetic clutch 1.3 Adjust magnetic clutch
2. Industry criteria	May include: 2.1 Manufacturer specifications 2.2 Repair/Service manual/Workplace procedures 2.3 Safety and environmental requirements 2.4 Service history
3. Dismantling tools	May include: 3.1 Special service tools (SST) for holding the magnetic clutch hub. 3.2 Snap ring expander
4. Materials	May include: 4.1 Refrigerant 4.2 Penetrating oil 4.3 PPEs - Face mask - Face shield* - Goggles - Gloves - Coverall suit - Safety shoes
5. Completion of magnetic clutch installation	May include: 5.1 Assembling of magnetic clutch 5.2 Installing of belt
6. Post-installation testing	May include: 6.1 Checking of noise 6.2 Monitoring of temperature 6.3 Monitoring of pressure 6.4 Final inspection belt tension
7. Workplace documents	May include: 7.1 Job order 7.2 Repair order 7.3 Inspection form 7.4 Diagnostic sheet

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared to repair manual air conditioner compressor magnetic clutch. 1.1.1 Determined job requirements. 1.1.2 Sourced and interpreted information. 1.1.3 Identified hazards associated with the work are and managed risks. 1.1.4 Selected and checked tools. 1.1.5 Reported defective and damaged tools. 1.1.6 Checked and reported availability. 1.1.7 Applied safety practices. 1.2 Removed magnetic clutch components. 1.2.1 Removed magnetic clutch. 1.2.2 Inspected clutch components. 1.2.3 Sourced out of specification parts. 1.2.4 Used tools. 1.2.5 Applied safety practices. 1.3 Installed magnetic clutch components. 1.3.1 Installed magnetic clutch components. 1.3.2 Measured tolerances, resistances and clearances. 1.3.3 Completed installation of magnetic clutch components. 1.3.4 Carried out post-installation testing. 1.3.5 Applied safety practices. 1.4 Completed work processes. 1.4.1 Made final inspection. 1.4.2 Turned-over vehicle. 1.4.3 Restored work area. 1.4.4 Managed wastes. 1.4.5 Checked and stored tools. 1.4.6 Accomplished workplace documents.
2. Resource implications	The following resources MUST be provided: 2.1 Workplace: Real or simulated work area 2.2 Tools, materials, and equipment relevant to perform required tasks 2.3 Manufacturer's repair manual 2.4 PPEs 2.5 Training vehicle 2.6 First aid kit 2.7 CPE
3. Method of assessment	Competency in this unit may be assessed through: 3.1 Demonstration with Oral questioning 3.2 Written exam 3.3 Direct Observation
4. Context for assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : DIAGNOSE AND REPAIR IGNITION SYSTEM

UNIT CODE : ALT723395

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to basic diagnosing and repair the ignition system such as ignition switch, spark plug, high tension wires/cables cables/ignition coil, and distributor.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare to diagnose and repair ignition system	1.1 ***Job requirements*** are determined from workplace instructions. 1.2 Diagnostic information is sourced and interpreted using ***industry criteria***. 1.3 Diagnostic symptoms are analyzed using troubleshooting guide and those most appropriate to the circumstances are selected. 1.4 Hazards associated with the work are identified and risks are managed. 1.5 ***Tools*** are selected and checked for serviceability. 1.6 Defective and damaged ***tools and equipment*** are reported following workplace procedures. 1.7 Availability of ***materials*** are checked and reported following workplace procedures.	1.1 Different job requirements 1.2 Diagnostic information 1.3 Troubleshooting guide 1.4 Industry criteria 1.5 Tools, and equipment in diagnosing and repairing ignition system 1.6 Inspection of tools, materials and equipment for serviceability and availability 1.7 Procedure in accomplishing forms 1.8 Electrical Fundamentals 1.9 Hazards associated with the operation 1.10 Management of risk 1.11 Planning and organizing activities 1.12 Chemistry (battery solutions and chemical reactions) 1.13 Tools and scan tools 1.14 OSHS	1.1 Interpreting text, symbols and wiring diagrams in information relating to ignition system testing and repair equipment from manufacturer specifications and workplace instructions and procedures 1.2 Planning own work requirements and prioritize actions to achieve required outcomes and ensure tasks are completed within workplace timeframes 1.3 Determining job requirements 1.4 Sourcing and interpreting diagnostic information 1.5 Analyzing and selecting diagnostic symptoms 1.6 Identifying hazards

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		1.15 Waste management 1.16 3Rs 1.17 5S	1.7 Managing risks 1.8 Selecting and checking diagnostic tools and equipment 1.9 Reporting defective and damaged tools and equipment 1.10 Checking and reporting availability of materials
2. Diagnose ignition system	2.1 Ignition system inspection is performed according to industry criteria. 2.2 Inspection results are compared with manufacturer specifications. 2.3 Faults are identified from diagnostic test results. 2.4 Causes of faults are determined following industry criteria. 2.5 Findings and recommendations for necessary repairs or adjustments are reported according to workplace procedures. 2.6 Safety practices are applied following Occupational Health and Safety (OSH) procedure.	2.1 Industry criteria 2.2 Faults of ignition system 2.3 Mensuration 2.4 Arithmetic operation 2.5 Test of spark plug cable resistance/ continuity 2.6 Test of ignition switch 2.7 Test of ignition wirings 2.8 Procedures for removing Ignition components 2.9 Visual inspections of ignition components 2.10 Procedure in accomplishing checklists 2.11 OSHS 2.12 Wearing of PPEs 2.13. Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 2.14 3Rs 2.15 5S 2.16 Attitude	2.1 Locating appropriate sources of information efficiently 2.2 Read and Compare ignition timing checking procedure from repair manuals 2.3 Interpreting numerical information in the manufacturer's repair manual 2.4 Measure voltage, current and resistance and use basic mathematical operations, including addition and subtraction, to calculate deviations from manufacturer specifications 2.5 Performing diagnostic tests 2.6 Carrying out inspection 2.7 Comparing inspection results

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		2.15.1 Patience 2.15.2 Attention to details 2.15.3 Time conscious 2.15.4 Honest	2.8 Identifying faults and its causes 2.9 Reporting findings 2.10 Applying safety practices
3. Repair ignition system	3.1 Repair information is sourced and interpreted. 3.2 ***Repair options*** are analyzed and selected following industry criteria. 3.3 Repair tools and materials are selected and checked. 3.4 Repairs and component replacements and adjustments are carried out according to industry criteria. 3.5 ***Post-repair testing*** is carried out according to workplace procedures. 3.6 Safety practices are applied following Occupational Health and Safety (OSH) procedure.	3.1 Sourcing and interpretation of repair information 3.2 Repair options 3.3 Repair tools and materials 3.4 Replacements and adjustments of components 3.5 Post-repair testing 3.6 Oscilloscope 3.7 Use of tools and equipment 3.8 Procedure in accomplishing checklists 3.9 Numerical information 3.10 Measurement of voltage, resistance and current 3.11 OSHS 3.12 Wearing of PPEs 3.13 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 3.14 Attitude: 3.13.1 Patient 3.13.2 Attention to details 3.13.3 Time conscious 3.13.4 Honest	3.1 Identifying and locating various sources of information 3.2 Interpreting text, symbols and wiring diagrams in information relating to ignition system testing from manufacturer specifications and workplace instructions and procedures 3.3 Technology skills: Using tools and operating equipment 3.4 Sourcing and interpreting repair information 3.5 Analyzing and selecting repair options 3.6 Selecting and checking repairing tools, and materials 3.7 Carrying out repairs and component replacements and adjustments 3.8 Carrying out post-repair testing 3.9 Applying safety practices

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
4. Complete work processes	4.1 Final inspection is made based on workplace procedure. 4.2 Vehicle is turned-over to immediate superior for quality control following workplace procedure. 4.3 Work area is restored following 5S of good housekeeping. 4.4 Wastes are managed following environmental rules and regulations. 4.5 Tools are checked and stored and any faulty equipment is identified, tagged and isolated according to workplace procedures. 4.6 ***Workplace documents*** are accomplished according to workplace procedures.	4.1 Procedure in accomplishing checklists 4.2 OSHS 4.3 Wearing of PPEs 4.4 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 4.5 Waste management 4.6 5S of good housekeeping 4.7 3Rs 4.8 Final inspection procedure 4.9 Vehicle turn-over procedure 4.10 Accomplishment of workplace documents 4.11 Attitude: 4.10.1 Patience 4.10.2 Attention to details 4.10.3 Time conscious 4.10.4 Honest	4.1 Conducting final inspection 4.2 Performing vehicle turn-over 4.3 Restoring work area 4.4 Managing wastes 4.5 Checking and storing tools and equipment 4.6 Accomplishing workplace documents

RANGE OF VARIABLES

VARIABLE	RANGE
1. Job requirements	Job requirements may include: 1.1 Check and replace the ignition switch 1.2 Check and replace contact points and condenser. 1.3 Check and adjust dwell angles 1.4 Check and replace the spark plug and high-tension wires 1.5 check and replace ignition coil 1.6 Check and replace distributor 1.7 Check and adjust spark plug air gap clearance 1.8 Check and replace igniter 1.9 Troubleshoot of ignition system circuit
2. Industry criteria	Industry criteria may include: 2.1 Manufacturer specifications 2.2 Repair/Service manual 2.3 Workplace procedures 2.4 Safety and environmental requirements
3. Tools and equipment	Tools and equipment may include: 3.1 Tools: 3.1.1 Basic hand tools 3.1.2 Feeler or thickness gauge 3.1.3 Multi – tester (analog and digital) 3.1.4 Spark plug wrench 3.2 Equipment: 3.2.1 Timing light 3.2.2 Service Trouble Light
4. Materials	Materials may include: 4.1 Cotton Rags 4.2 Grease 4.3 Penetrating oil 4.4 Electrical tape 4.5 Contact cleaner 4.6 PPEs - Face mask - Face shield* - Goggles - Gloves - Coverall suit - Safety shoes
5. Repair options	Repair options may include: 5.1 Replacement 5.2 Soldering 5.3 Adjusting 5.4 Insulating
6. Post-repair testing	May include: 6.1 Check and secure wiring/harness connections 6.2 Check ignition switch connections

VARIABLE	RANGE
	6.3 Check engine idling and revving condition 6.4 Check high tension wirings/cables 6.5 Check spark plugs condition and performance 6.6 Check ignition timing
7. Workplace documents	Workplace documents may include: 7.1 Job order 7.2 Repair order 7.3 Inspection form 7.4 Diagnostic sheet

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepare to diagnose differential assembly. 1.1.1 Determined job requirements. 1.2 Prepared to diagnose and repair ignition system. 1.2.1 Determined job requirements. 1.2.2 Sourced and interpreted diagnostic information. 1.2.3 Analyzed diagnostic symptoms. 1.2.4 Identified hazards associated with the work and managed risks. 1.2.5 Selected and checked tools. 1.2.6 Reported defective and damaged tools and equipment. 1.1.7 Checked and reported availability of materials. 1.3 Diagnosed ignition system. 1.3.1 Performed ignition system inspection. 1.3.2 Compared inspection results. 1.3.3 Identified faults. 1.3.4 Determined causes of faults. 1.3.5 Reported findings and recommendations for necessary repairs or adjustments. 1.3.6 Applied safety practices. 1.4 Repaired ignition system. 1.4.1 Sourced and interpreted repair information. 1.4.2 Analyzed and selected repair options. 1.4.3 Selected and checked repair tools and materials. 1.4.4 Carried out repairs and component replacements and adjustments. 1.4.5 Carried out post-repair testing. 1.4.6 Applied safety practices. 1.5 Completed work processes. 1.5.1 Made final inspection. 1.5.2 Turned-over vehicle. 1.5.3 Restored work area. 1.5.4 Managed wastes. 1.5.5 Checked and stored tools and identified, tagged and isolated any faulty equipment. 1.5.6 Accomplished workplace documents.
2. Resource implications	The following resources MUST be provided: 2.1 Workplace: Real or simulated work area 2.2 Tools, materials, and equipment relevant to perform required tasks 2.3 Manufacturer’s repair manual 2.4 PPEs 2.5 Training vehicle 2.6 CPE

3. Method of assessment	Competency should be assessed through: 3.1 Demonstration with Oral questioning 3.2 Written exam 3.3 Direct Observation
4. Context for assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : DIAGNOSE AND REPAIR STARTING SYSTEM

UNIT CODE : ALT723396

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to diagnose and repair starting system and its component.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare to diagnose and repair starting system	1.1 ***Job requirements*** are determined based from ***industry criteria*** 1.2 Diagnostic information is sourced and interpreted using industry criteria 1.3 Diagnostic symptoms are analyzed using troubleshooting guide and those most appropriate to the circumstances are selected 1.4 Hazards associated with the work are identified and risks are managed 1.5 ***Tools, equipment, and materials*** are selected and checked for serviceability 1.6 Defective and damaged tools and equipment are reported following workplace procedures. 1.7 Availability of materials are checked and reported following workplace procedures	1.1 Different job requirements 1.2 Diagnostic information 1.3 Troubleshooting guide 1.4 Industry criteria 1.5 Tools, equipment, and materials in diagnosing and repairing starting system 1.6 Procedure in accomplishing forms 1.7 Pre-heating System Operation for Diesel Engine 1.8 Chemistry (battery solutions and chemical reactions) 1.9 Hazards associated with the operations 1.10 Risk Management 1.11 OSHS 1.12 Tools and measuring equipment	1.1 Interpreting job requirements from workplace instructions 1.2 Selecting best tooling option for the work and sequence procedure to reduce time and material wastage 1.3 Sourcing and interpreting diagnostic information 1.4 Analyzing diagnostic options 1.5 Using troubleshooting guide 1.6 Identifying hazards 1.7 Managing risks 1.8 Selecting and checking tools, equipment and materials 1.9 Reporting defective and damaged tools and equipment 1.10 Checking and reporting the availability of materials

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Diagnose starting system	2.1 Diagnostic tests are performed according to industry criteria. 2.2 Inspection is carried out according to industry criteria. 2.3 Inspection results are compared with manufacturer specifications 2.4 Faults are identified from diagnostic test following industry criteria 2.5 Causes of faults are determined following industry criteria 2.6 Findings are reported according to workplace procedures, including recommendations for required repairs or adjustments 2.7 Safety practices are applied following Occupational Health and Safety (OSH) procedure.	2.1 Industry criteria 2.2 Component faults of starting system 2.3 Mensuration 2.4 Inspection procedure 2.5 Arithmetic operation 2.6 Fundamentals of electricity and magnetism 2.7 Principles of combustion, pressure and temperature 2.8 Pre-heating System Operation for Diesel Engine 2.9 Chemistry (battery solutions and chemical reactions) 2.10 Hazards associated with the operations 2.11 Risk Management 2.12 Fundamentals of electricity 2.13 Procedure in accomplishing checklists 2.14 OSHS 2.15 Wearing of PPEs 2.16 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 2.17 3Rs 2.18 5S 2.19 Attitude: ▪ Patient ▪ Attention to details ▪ Time conscious	2.1 Locating appropriate sources of information 2.2 Interpreting text, symbols, and wiring diagrams in diagnostic and repair information 2.3 Interpreting numerical information in manufacturer repair manual. 2.4 Performing diagnostic tests 2.5 Carrying out inspection 2.6 Comparing inspection results 2.7 Identifying faults and its causes 2.8 Reporting findings 2.9 Applying safety practices 2.10 Managing risk 2.11 Identifying hazards 2.12 Conducting glow plug test and performance

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		▪ Honest	
3. Repair starting system	3.1 Repair information is sourced and interpreted 3.2 Repair options are analyzed and selected following industry criteria 3.3 Repair tools, equipment and materials are selected and checked according to manufacturer specifications and workplace procedures 3.4 Repairs and component replacements and adjustments are carried out according to industry criteria 3.5 Post-repair testing is carried out according to workplace procedures 3.6 Safety practices are applied following Occupational Health and Safety (OSH) procedure	3.1 Sourcing and interpretation of repair information 3.2 Repair symptoms 3.3 Repair options 3.4 Repair tools, equipment, and materials 3.5 Replacements and adjustments of components 3.6 Post-repair testing 3.7 Fundamentals of electricity and magnetism 3.8 Hazards associated with the operations 3.9 Risk Management 3.10 Procedure in accomplishing checklists 3.11 Numerical information 3.12 OSHS 3.13 Wearing of PPEs 3.14 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 3.15 3Rs 3.16 5S 3.17 Attitude: ▪ Patience ▪ Attention to details ▪ Time conscious ▪ Honest	3.1 Locating appropriate sources of information efficiently. 3.2 Interpreting text, symbols, and wiring diagrams in diagnostic and repair information 3.3 Interpreting numerical information in manufacturer repair manual. 3.4 Using multi-tester Sourcing and interpreting repair information 3.5 Analyzing and selecting repair symptoms 3.6 Analyzing repair options 3.7 Selecting and checking repairing tools, equipment, and materials 3.8 Carrying out repairs and component replacements and adjustments 3.9 Carrying out post-repair testing 3.10 Applying safety practices 3.11 Managing risk 3.12 Identifying hazards
4. Complete work processes	4.1 Final inspection is made based on workplace procedure	4.1 OSHS 4.2 Wearing of PPEs 4.3 Health protocols issued by	4.1 Filling-out workplace documentation

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	4.2 Vehicle is turned-over to immediate superior for quality control following workplace procedure 4.3 Work area is restored following 5S of good housekeeping. 4.4 Wastes are managed following environmental rules and regulations. 4.5 Tools and equipment are checked and stored according to workplace procedures 4.6 Workplace documents are accomplished according to workplace procedures	government on prevention on spread of and protection from infectious disease in the workplace 4.4 Waste management 4.5 5S of good housekeeping 4.6 3Rs 4.7 Final inspection procedure 4.8 Vehicle turn-over procedure 4.9 Accomplishment of workplace documents 4.10 Attitude: ▪ Patience ▪ Attention to details ▪ Time conscious ▪ Honest	4.2 Conducting final inspection 4.3 Performing vehicle turn-over 4.4 Restoring work area 4.5 Managing wastes 4.6 Checking and storing tools and equipment 4.7 Accomplishing workplace documents

RANGE OF VARIABLES

VARIABLE	RANGE
1. Job requirements	Job requirement may include: 1.1 Inspection of starter motor components operation 1.2 Repair and replacement of starter motor 1.3 Inspection and repair of starting system circuit
2. Industry criteria	May include: 2.1 Manufacturer specifications 2.2 Repair/Service manual 2.3 Workplace procedures 2.4 Safety and environmental requirements 2.5 Technical Service bulletin
3. Tools and equipment	Tools, equipment and materials may include: **Tools:** 3.1 Basic hand tools 3.2 Torque wrench 3.3 Multimeter 3.4 Bench vice 3.5 Ammeter (60-100 Amp) (digital and analog) 3.6 Multi- tester (analog and digital) 3.7 Jumper cable 3.8 Soldering iron 3.9 Soldering stand 3.10 Trouble light 3.11 Extension/ power cable (10m) 3.12 Desoldering tool 3.13 Vernier Caliper **Equipment:** 3.14 Hydraulic Lifter 3.15 Crocodile jack 3.16 Jack stand 3.17 Puller 3.18 Creeper **Materials** 3.19 Rags 3.20 Contact cleaner 3.21 Penetrating oil 3.22 Gloves 3.23 Sand paper 3.24 Grease 3.25 Soldering lead 3.26 Soldering paste 3.27 Electrical tape 3.28 Automotive wire (various sizes) - #16 awg - #18 awg - #12 awg 3.29 Cable tie 3.30 Carbon brush

VARIABLE	RANGE
	3.31 CPE 3.32 PPEs - Face mask - Face shield * - Goggles - Gloves - Coverall suit - Safety shoes
4. Repair option	Repair option may include: 4.1 Replace armature coil 4.2 Replace field coil 4.3 Replace bearings 4.4 Replace carbon brush 4.5 Replace magnetic switch 4.6 Replace starter motor assembly
5. Post-repair testing	May include: 5.1 Check and secure wiring connections 5.2 Secure tightening of starter motor 5.3 Check and test starting system performance
6. Workplace documents	Workplace documents may include: 6.1 Job order 6.2 Repair order 6.3 Inspection form 6.4 Diagnostic sheet

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared to diagnose and repair starting system 1.2 Diagnosed starting system 1.3 Repaired starting system 1.4 Completed work processes 1.5 Replaced pre-heating system components 1.6 Applied safety practices
2. Resource implications	The following resources must be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate Tools & equipment 2.3 Materials relevant to the activity 2.4 Manufacturer's repair manual 2.5 PPEs 2.6 Training Vehicle 2.7 First-Aid Kit
3. Method of assessment	Competency should be assessed through: 3.1 Demonstration with Oral questioning 3.2 Written exam 3.3 Direct Observation
4. Context for assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : DIAGNOSE AND REPAIR CHARGING SYSTEM

UNIT CODE : ALT723397

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to diagnose and repair charging system and its component

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare to diagnose and repair charging system	1.1 ***Job requirements*** are determined from workplace instructions 1.2 Diagnostic information is sourced and interpreted using ***industry criteria*** 1.3 Diagnostic symptoms are analyzed using troubleshooting table guide and those most appropriate to the circumstances are selected 1.4 Hazards associated with the work are identified and risks are managed. 1.5 ***Tools, equipment, and materials*** are selected and checked for serviceability 1.6 Defective and damaged tools and equipment are reported following workplace procedures. 1.7 Availability of materials are checked and	1.1 Different job requirements 1.2 Diagnostic information 1.3 Troubleshooting guide 1.4 Industry criteria 1.5 Tools, equipment, and materials in diagnosing and repairing charging system 1.6 Procedure in accomplishing forms 1.7 Types of Alternator Pulley 1.8 Identifying hazards associated with the operation 1.9 Risk management 1.10 OSHS 1.11 Waste management 1.12 Tools and measuring equipment	1.1 Interpreting job requirements from workplace instructions 1.2 Selecting best tooling option for the work and sequence procedure to reduce time and material wastage 1.3 Sourcing and interpreting diagnostic information 1.4 Analyzing diagnostic options 1.5 Using troubleshooting guide 1.6 Identifying hazards 1.7 Managing risks 1.8 Selecting and checking tools, equipment and materials 1.9 Reporting non-serviceable tools and equipment 1.10 Checking and reporting the availability of materials

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	reported following workplace procedures		
2. Diagnose charging system	2.1 ***Diagnostic tests*** are performed according to industry criteria***.*** 2.2 Inspection is carried out according to industry criteria. 2.3 Inspection results are compared with manufacturer specifications 2.4 Faults are identified from diagnostic test results following industry criteria 2.5 Causes of faults are determined following industry criteria 2.5 Findings are reported according to workplace procedures, including recommendations for required repairs or adjustments 2.6 Safety practices are applied following Occupational Health and Safety (OSH) procedure.	2.1 Industry criteria 2.2 Component faults of charging system 2.3 Mensuration 2.4 Inspection procedure 2.5 Arithmetic operation 2.6 Battery tester 2.7 Fundamentals of Electromagnetism 2.8 Fundamental of electricity 2.9 Procedure in accomplishing checklists 2.10 OSHS 2.11 Wearing of PPEs 2.12 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 2.13 3Rs 2.14 5S 2.15 Attitude: ▪ Patience ▪ Attention to details ▪ Time conscious ▪ Honest	2.1 Locating appropriate sources of information 2.2 Interpreting text, symbols, and wiring diagrams in diagnostic and repair information 2.3 Interpreting numerical information in manufacturer repair manual. 2.4 Performing diagnostic tests 2.5 Carrying out inspection 2.6 Comparing inspection results 2.7 Identifying faults and its causes 2.8 Reporting findings 2.9 Applying safety practices

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Repair charging system	3.1 Repair information is sourced and interpreted 3.3 ***Repair options*** are analyzed and selected following industry criteria 3.3 Repair tools, equipment and materials are selected and checked according to manufacturer specifications and workplace procedures 3.4 Repairs and component replacements and adjustments are carried out according to industry criteria 3.5 ***Post-repair testing*** is carried out according to workplace procedures 3.6 Safety practices are applied following Occupational Health and Safety (OSH) procedure	3.1 Sourcing and interpretation of repair information 3.2 Repair options 3.3 Repair tools, equipment, and materials 3.4 Replacements and adjustments of components 3.5 Post-repair testing 3.6 Fundamentals of electricity and magnetism 3.7 Hazards associated with the operations 3.8 Risk Management 3.9 Mensuration on alternator charging 3.10 Resistance checking 3.11 Diodes Test 3.12 Procedure in accomplishing checklists 3.13 OSHS 3.14 Wearing of PPEs 3.15 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 3.16 3.17 3Rs 3.18 5S 3.19 Attitude: ▪ Patience ▪ Attention to details ▪ Time conscious ▪ Honest	3.1 Locating appropriate sources of information efficiently. 3.2 Interpreting text, symbols, and wiring diagrams in diagnostic and repair information 3.3 Interpreting numerical information in manufacturer repair manual. 3.4 Using multi-testers. 3.5 Sourcing and interpreting repair information 3.6 Analyzing and selecting repair symptoms 3.7 Selecting and checking repairing tools, equipment, and materials 3.8 Carrying out repairs and component replacements and adjustments 3.9 Carrying out post-repair testing 3.10 Applying safety practices 3.11 Identifying hazards 3.12 Managing risk

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
4. Complete work processes	4.1 Final inspection is made based on workplace procedure 4.2 Vehicle is turned-over to immediate superior for quality control following workplace procedure 4.3 Work area is restored following 5S of good housekeeping. 4.4 Wastes are managed following environmental rules and regulations. 4.5 Tools and equipment are checked and stored according to workplace procedures 4.6 ***Workplace documents*** are accomplished according to workplace procedures	4.1 OSHS 4.2 Wearing of PPEs 4.3 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 4.4 Waste management 4.5 5S of good housekeeping 4.6 3Rs 4.7 Final inspection procedure 4.8 Vehicle turn-over procedure 4.9 Accomplishment of workplace documents 4.10 Attitude: ▪ Patience ▪ Attention to details ▪ Time conscious ▪ Honest	4.1 Filling-out workplace documentation Conducting final inspection 4.2 Performing vehicle turn-over 4.3 Restoring work area 4.4 Managing wastes 4.5 Checking and storing tools and equipment 4.6 Accomplishing workplace documents

RANGE OF VARIABLES

VARIABLE	RANGE
1. Job requirements	Job requirements may include: 1.1 Inspection and Replacement of bulbs, fuses, relays and switches 1.2 Inspection and Repair wiring harness and connectors 1.3 Inspection and Replacement of power regulator, motor, power door lock, wiper and washer motor, horn, air-conditioner and electrical accessories
2. Industry criteria	Industry criteria may include: 2.1 Manufacturer specifications 2.2 Repair manual 2.3 Workplace procedures 2.4 Safety and environmental requirements 2.5 Electric Wiring Diagram (EWD)
3. Tools, equipment and materials	Tools, equipment and materials may include: **Tools:** 3.1 Basic hand tools (wire stripper, side cutter/diagonal plier and long nose plier) 3.2 Torque wrench 3.3 multi-tester (analog and digital) 3.4 Soldering iron 3.5 Clamp Type Ammeter 3.6 Bench vice 3.7 Harness and terminal repair kit 3.8 Soldering stand 3.9 Desoldering tools 3.10 Extension Power cable **Equipment:** 3.11 Battery charger 3.12 Battery load tester **Materials** 3.13 PPEs - Face mask - Face shield* - Goggles - Gloves - Coverall suit - Safety shoes 3.14 Rags 3.15 Contact cleaner 3.16 Penetrating oil 3.17 Sand paper 3.18 Electrical tape 3.19 Shrinkable tube Fuse for bulbs 3.20 Fusible link for battery 3.21 Soldering lead 3.22 Soldering paste

VARIABLE	RANGE
	3.23 Bulbs – (12 volts) - Double contact - Single contact - Headlight bulb - Peanut bulb 3.24 Fuses - 7.5 amph - 10 amph - 15 amph - 20 amph - 30 amph 3.25 Relays (30-60 Amp) 12 volts 3.26 Switches - Toggle switch (6 terminal) - Push pull switch - Push button switch 3.27 Electrical tape 3.28 Eye terminal 3.29 Female terminal 3.30 Male Terminal
4. Diagnostic tests	Diagnostic tests may include: 4.1 Checking of voltage and power supply 4.2 Continuity checking of bulb, relays, wiring, grounds
5. Repair option	Repair option may include: 5.1 Soldering of wires 5.2 Replace fuse, relays, switches and bulbs 5.3 Replace assembly components
6. Post-repair testing	Post-repair testing may include: 6.1 Check and secure wiring connections 6.2 Secure fuses, relay, switches and connectors 6.3 Check operation such as power window, power door lock, windshield wiper, radio, sun roof, instrument panel and gauges and lighting system
7. Workplace documents	May include: 7.1 Repair order 7.2 Inspection form

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared to diagnose and repair body electrical system 1.2 Diagnosed body electrical system 1.3 Repaired body electrical system 1.4 Completed work processes 1.5 Applied safety practices
2. Resource implications	The following resources MUST be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate Tools & equipment 2.3 Materials relevant to the activity 2.4 Manufacturer's repair manual 2.5 PPEs 2.6 Training vehicle 2.7 First aid kit 2.8 CPE
3. Method of assessment	Competency should be assessed through: 3.1 Demonstration with Oral questioning 3.3 Written exam 3.4 Direct Observation
4. Context for assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY: DIAGNOSE AND REPAIR BODY ELECTRICAL SYSTEM

UNIT CODE: ALT723398

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes required to diagnose and repair body electrical system such as lighting, wiper, door locks, power window, horn, accessories and other electrical system

ELEMENT	PERFORMANCE CRITERIA	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
1. Prepare to diagnose and repair body electrical system	1.1 ***Job requirements*** are determined from workplace instructions 1.2 Diagnostic information is sourced and interpreted using ***industry criteria*** 1.3 Diagnostic symptoms are analyzed using troubleshooting guide and those most appropriate to the circumstances are selected 1.4 Hazards associated with the work are identified and risks are managed 1.5 ***Tools, equipment, and materials*** are selected and checked for serviceability 1.6 Defective and damaged tools and equipment are reported following workplace procedures. 1.7 Availability of materials are checked and reported following workplace procedures	1.1 Different job requirements 1.2 Diagnostic information 1.3 Troubleshooting guide 1.4 Industry criteria 1.5 Tools, equipment, and materials in diagnosing and repairing body electrical system 1.6 Procedure in accomplishing forms 1.7 Identifying hazards associated with the operation 1.8 Risk management 1.9 Fundamentals of electricity and electronics 1.10 OSHS 1.11 Waste management 1.12 Tools and measuring equipment	1.1 Interpreting job requirements from workplace instructions 1.2 Selecting best tooling option for the work and sequence procedure to reduce time and material wastage 1.3 Sourcing and interpreting diagnostic information 1.4 Analyzing diagnostic options 1.5 Using troubleshooting guide 1.6 Identifying hazards 1.7 Managing risks 1.8 Selecting and checking tools, equipment and materials 1.9 Reporting non-serviceable tools and equipment 1.10 Checking and reporting the availability of materials

2. Diagnose body electrical system	2.1 ***Diagnostic tests*** are performed according to industry criteria***.*** 2.2 Inspection is carried out according to industry criteria. 2.3 Inspection results are compared with manufacturer specifications 2.4 Faults are identified from diagnostic test results following industry criteria 2.5 Causes of faults are determined following industry criteria 2.6 Findings are reported according to workplace procedures, including recommendations for required repairs or adjustments 2.7 Safety practices are applied following Occupational Health and Safety (OSH) procedure.	2.1 Electrical principles 2.1.1 Current, voltage, resistance and power 2.2 Series circuits 2.3 Parallel circuits 2.4 Series parallel circuits 2.5 Ohm's law 2.6 Diagnostic tests 2.7 Faults and its causes 2.8 Electrical troubleshooting guide 2.9 Industry criteria 2.10 Faults of body electrical system 2.11 Manual air-conditioner system 2.12 Lighting 2.13 Wiper operation 2.14 Door locks 2.15 Window regulator 2.16 Horn 2.17 Accessories 2.18 Mensuration 2.19 Inspection procedure 2.20 Arithmetic operation 2.21 Battery tester 2.22 Fundamentals of electromagnetism 2.23 Fundamental of electricity 2.24 Techniques for reading and interpreting technical information, including circuit types, diagrams and symbols 2.25 Procedures for using and operating electrical test equipment 2.26 Procedure in accomplishing checklists 2.27 OSHS	2.1 Locating appropriate sources of information 2.2 Interpreting text, symbols, and wiring diagrams in diagnostic and repair information 2.3 Interpreting numerical information in manufacturer repair manual. 2.4 Performing diagnostic tests 2.5 Carrying out inspection 2.6 Comparing inspection results 2.7 Identifying faults and its causes 2.8 Reporting findings 2.9 Applying safety practices

		2.28 Wearing of PPEs 2.29 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 2.30 3Rs 2.31 5S 2.32 Attitude: ▪ Patience ▪ Attention to details ▪ Time conscious ▪ Honest	

3. Repair body electrical system	3.1 Repair information is sourced and interpreted 3.2 ***Repair options*** are analyzed and selected following industry criteria 3.3 Repair tools, equipment and materials are selected and checked according to manufacturer specifications and workplace procedures 3.4 Repairs and component replacements and adjustments are carried out according to industry criteria 3.5 ***Post-repair testing*** is carried out according to workplace procedures 3.6 Safety practices are applied following Occupational Health and Safety (OSH) procedure	3.1 Sourcing and interpretation of repair information 3.2 Repair options 3.3 Repair tools, equipment, and materials 3.4 Replacements and adjustments of components 3.5 Soldering technique 3.6 Post-repair testing 3.7 Fundamentals of electronics and electricity 3.8 Hazards associated with the operations 3.9 Risk Management 3.10 Resistance checking 3.11 Procedure in accomplishing checklists 3.12 OSHS 3.13 Wearing of PPEs 3.14 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace 3.15 3Rs 3.16 5S 3.17 Attitude: ▪ Patience ▪ Attention to details ▪ Time conscious ▪ Honest	3.1 Locating appropriate sources of information efficiently. 3.2 Interpreting text, symbols, and wiring diagrams in diagnostic and repair information 3.3 Interpreting numerical information in manufacturer repair manual. 3.4 Using multi-testers 3.5 Sourcing and interpreting repair information 3.6 Analyzing and selecting repair symptoms 3.7 Selecting and checking repairing tools, equipment, and materials 3.8 Carrying out repairs and component replacements and adjustments 3.9 Carrying out post-repair testing 3.10 Applying safety practices 3.11 Identifying hazards 3.12 Managing risk
4. Complete work processes	4.1 Final inspection is made based on workplace procedure 4.2 Vehicle is turned-over to immediate superior for quality control following workplace procedure	4.1 OSHS 4.2 Wearing of PPEs 4.3 Health protocols issued by government on prevention on spread of and protection from infectious disease in the workplace	4.1 Filling-out workplace documentation Conducting final inspection 4.2 Performing vehicle turn-over 4.3 Restoring work area 4.4 Managing wastes

	4.3 Work area is restored following 5S of good housekeeping. 4.4 Wastes are managed following environmental rules and regulations. 4.5 Tools and equipment are checked and stored according to workplace procedures 4.6 ***Workplace documents*** are accomplished according to workplace procedures	4.4 Waste management 4.5 5S of good housekeeping 4.6 3Rs 4.7 Final inspection procedure 4.8 Vehicle turn-over procedure 4.9 Accomplishment of workplace documents 4.10 Attitude: ▪ Patience ▪ Attention to details ▪ Time conscious ▪ Honest	4.5 Checking and storing tools and equipment 4.6 Accomplishing workplace documents

RANGE OF VARIABLES

VARIABLE	RANGE
1. Job requirements	Job requirements may include: 1.1 Inspection and Replacement of bulbs, fuses, relays and switches 1.2 Inspection and Repair wiring harness and connectors 1.3 Inspection and Replacement of power regulator, motor, power door lock, wiper and washer motor, horn, air-conditioner and electrical accessories
2. Industry criteria	Industry criteria may include: 2.1 Manufacturer specifications 2.2 Repair manual 2.3 Workplace procedures 2.4 Safety and environmental requirements 2.5 Electric Wiring Diagram (EWD)
3. Tools, equipment and materials	Tools, equipment and materials may include: **Tools:** 3.1 Basic hand tools (wire stripper, side cutter/diagonal plier and long nose plier) 3.2 Torque wrench 3.3 multi-tester (analog and digital) 3.4 Soldering iron 3.5 Clamp Type Ammeter 3.6 Bench vice 3.7 Harness and terminal repair kit 3.8 Soldering stand 3.9 Desoldering tools 3.10 Extension Power cable **Equipment:** 3.11 Battery charger 3.12 Battery load tester **Materials** 3.13 PPEs - Face mask - Face shield* - Goggles - Gloves - Coverall suits - Safety shoes 3.14 Rags 3.15 Contact cleaner 3.16 Penetrating oil 3.17 Sand paper 3.18 Electrical tape 3.19 Shrinkable tube Fuse for bulbs 3.20 Fusible link for battery 3.21 Soldering lead 3.22 Soldering paste 3.23 Bulbs – (12 volts) - Double contact

	- Single contact - Headlight bulb - Peanut bulb 3.24 Fuses - 7.5 amph - 10 amph - 15 amph - 20 amph - 30 amph 3.25 Relays (30-60 Amp) 12 volts 3.26 Switches - Toggle switch (6 terminal) - Push pull switch - Push button switch 3.27 Electrical tape 3.28 Eye terminal 3.29 Female terminal 3.30 Male Terminal
4. Diagnostic tests	Diagnostic tests may include: 4.1 Checking of voltage and power supply 4.2 Continuity checking of bulb, relays, wiring, grounds
5. Repair options	Repair option may include: 5.1 Soldering of wires 5.2 Replace fuse, relays, switches and bulbs 5.3 Replace assembly components
6. Post-repair testing	Post-repair testing may include: 6.5 Check and secure wiring connections 6.6 Secure fuses, relay, switches and connectors 6.7 Check operation such as power window, power door lock, windshield wiper, radio, sun roof, instrument panel and gauges and lighting system
7. Workplace documents	Workplace documents may include: 7.1 Repair order 7.2 Inspection form

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared to diagnose and repair body electrical system 1.2 Diagnosed body electrical system 1.3 Repaired body electrical system 1.4 Completed work processes 1.5 Applied safety practices
2. Resource implications	The following resources must be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate Tools & equipment 2.3 Materials relevant to the activity 2.4 Manufacturer's repair manual 2.5 PPEs 2.6 Training vehicle 2.7 First aid kit 2.8 CPE
3. Method of assessment	Competency should be assessed through: 3.1 Demonstration with Oral questioning 3.3 Written exam 3.4 Direct Observation
4. Context for assessment	4.1 Competency must be assessed on the job or simulated environment.

SECTION 3 TRAINING ARRANGEMENTS

These standards are set to provide technical and vocational education and training (TVET) providers with information and other important requirements to consider when designing training programs for **AUTOMOTIVE SERVICING (ELECTRICAL REPAIR) NC II**.

3.1 CURRICULUM DESIGN

TESDA shall provide the training on the development of competency-based curricula to enable training providers develop their own curricula with the components mentioned below.

Delivery of knowledge requirements for the basic, common and core units of competency specifically in the areas of mathematics, science/technology, communication/language and other academic subjects shall be contextualized. To this end, TVET providers shall develop a Contextual Learning Matrix (CLM) to accompany the curricula.

Course Title: **AUTOMOTIVE SERVICING (ELECTRICAL REPAIR)** **NC Level** **NC II**

Nominal Training Duration:

37	Hours (Basic Competencies)
162	Hours (Common Competencies)
213	Hours (Core Competencies)
412	
176	**SIL**
588	**TOTAL HOURS**

Course Description:

This course is designed to enhance the knowledge, skills and attitudes of an individual in the field of automotive servicing in accordance with industry standards. It covers specialized competencies such as servicing manual air- conditioner system, diagnosing and repairing manual air- conditioner system, repairing manual air-conditioner compressor magnetic clutch, diagnosing and repairing ignition system, starting system, charging system and body electrical system.

Upon completion of the course, the learners are expected to demonstrate the above-mentioned competencies to be employed. To obtain this, all units prescribed for this qualification must be achieve.

BASIC COMPETENCIES
37 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration

1. Participate in workplace communication	1.1 Obtain and convey workplace information	• Describe Organizational policies
		• Read:
		  ○ Effective communication
		  ○ Written communication
		  ○ Communication procedures and systems
		• Identify:
		  ○ Different modes of communication
		  ○ Medium of communication
		  ○ Flow of communication
		  ○ Available technology relevant to the enterprise and the individual's work responsibilities
		• Prepare different Types of question
		• Gather different sources of information
		• Apply storage system in establishing workplace information
		• Demonstrate Telephone courtesy
			• Group discussion
			• Lecture
			• Demonstration
				• Oral evaluation
				• Written examination
				• Observation
					2 Hours

	1.2 Perform duties following workplace instructions	• Read:
		  ○ Written notices and instructions
		  ○ Workplace interactions and procedures
			• Group discussion
			• Lecture
			• Demonstration
				• Oral evaluation
				• Written examination
				• Observation
					2 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		• Read instructions on work related forms/documents • Perform workplace duties scenario following workplace nstructions			

	1.3 Complete relevant work related documents	• Describe Communication procedures and systems
		• Read:
		  ○ Meeting protocols
		  ○ Nature of workplace meetings
		  ○ Workplace interactions
		  ○ Barriers of communication
		• Read instructions on work related forms/documents
		• Practice:
		  ○ Estimate, calculate and record routine workplace measures
		  ○ Basic mathematical processes of addition, subtraction, division and multiplication
		• Demonstrate office activities in:
		  ○ workplace meetings and discussions scenario
		• Perform workplace duties scenario following simple written notices
		• Follow simple spoken language
		• Identify the different Non-verbal communication
			• Group discussion
			• Lecture
			• Demonstration
			• Role play
				• Oral evaluation
				• Written examination
				• Observation
					2 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		• Demonstrate ability to relate to people of social range in the workplace • Gather and provide information in response to workplace requirements • Complete work related documents			
2. Work in a team environment	2.1 Describe team role and scope	• Discussion on team roles and scope • Participate in the discussion: ○ Definition of Team ○ Difference between team and group ○ Objectives and goals of team • Locate needed information from the different sources of information	• Lecture/ Discussion • Group Work • Individual Work • Role Play	• Role Play • Case Study • Written Test	1 Hour
	2.2 Identify one's role and responsibility within team	• Role play: ○ individual role and responsibility • Role Play ○ Understanding Individual differences • Discussion on gender sensitivity	• Role Play • Lecture/ Discussion	• Role Play • Written Test	1 Hour
	2.3 Work as a team member	• Participate in group planning activities • Role play: Communication protocols • Participate in the discussion of standard work procedures and practices	• Group work • Role Play • Lecture/ Discussion	• Role Play • Written Test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
3. Solve/address routine problems	3.1 Identify routine problems	• Review of the current industry hardware and software products and services • Identify correctly the industry maintenance, service and helpdesk practices, processes and procedures • Make use of the industry standard diagnostic tools • Share best practices in determining basic malfunctions and resolutions to general problems in the workplace • Analyze routine/procedural problems	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour
	3.2 Look for solutions to routine problems	• Review of the current industry hardware and software products and services • Identify correctly the industry maintenance, service and helpdesk practices, processes and procedures • Make use of the industry standard diagnostic tools • Share best practices in determining basic malfunctions and resolutions to general problems in the workplace • Formulate possible solutions to problems and document procedures for reporting	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	3.3 Recommend solutions to problems	• Discuss standard operating procedures and documentation processes	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour
4. Develop Career and Life Decisions	4.1 Manage one's emotion	• Demonstrate self-management strategies that assist in regulating behavior and achieving personal and learning goals • Explain enablers and barriers in achieving personal and career goals • Identify techniques in handling negative emotions and unpleasant situation in the workplace such as frustration, anger, worry, anxiety, etc. • Manage properly one's emotions and recognize situations that cannot be changed and accept them and remain professional • Recall instances that demonstrate self- discipline, working independently and showing initiative to achieve personal and career goals	• Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing	• Demonstration or simulation with oral questioning • Case problems involving workplace diversity issues	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		• Share experiences that show confidence, and resilience in the face of setbacks and frustrations and other negative emotions and unpleasant situations in the workplace			
	4.2 Develop reflective practice	• Enumerate strategies to improve one's attitude in the workplace • Explain Gibbs' Reflective Cycle/Model (Description, Feelings, Evaluation, Analysis, Conclusion, and Action plan) • Use basic SWOT analysis as self-assessment strategy • Develop reflective practice through realization of limitations, likes/ dislikes; through showing of self-confidence • Demonstrate self-acceptance and being able to accept challenges	• Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • 5 Role-playing	• Demonstration or simulation with oral questioning • Case problems involving workplace diversity issues	1 Hour
	4.3 Boost self-confidence and develop self-regulation	• Describe the components of self-regulation based on Self-Regulation Theory (SRT) • Explain personality development concepts • Cite self-help concepts (e. g., 7 Habits by Stephen Covey, transactional analysis, psycho-spiritual concepts) • Perform effective communication skills – reading, writing, conversing skills	• Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing	• Demonstration or simulation with oral questioning • Case problems involving workplace diversity issues	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		• Show affective skills – flexibility, adaptability, etc. • Determine strengths and weaknesses			
5. Contribute to workplace innovation	5.1 Identify opportunities to do things better	• Identify different roles of individuals in contributing to doing things better in the workplace • Appreciate positive impacts and challenges in innovation • Show mastery of the different types of changes and levels of participation in the workplace • Discuss 7 habits of highly effective people	• Interactive Lecture • Appreciative Inquiry • Demonstration • Group work	• Psychological and behavioral Interviews • Performance Evaluation • Life Narrative Inquiry • Review of portfolios of evidence and third-party workplace reports of on-the-job performance. • Standardized assessment of character strengths and virtues applied	1 Hour
	5.2 Discuss and develop ideas with others	• Identify different roles of individuals in contributing to doing things better in the workplace • Appreciate positive impacts and challenges in innovation • Show mastery of the different types of changes and levels of participation in the workplace	• Interactive Lecture • Appreciative Inquiry • Demonstration • Group work	• Psychological and behavioral Interviews • Performance Evaluation • Life Narrative Inquiry	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		• Discuss 7 habits of highly effective people • Communicate ideas through small group discussions and meetings		• Review of portfolios of evidence and third-party workplace reports of on-the-job performance. • Standardized assessment of character strengths and virtues applied	
	5.3 Integrate ideas for change in the workplace	• Identify different roles of individuals in contributing to doing things better in the workplace • Appreciate positive impacts and challenges in innovation • Show mastery of the different types of changes and levels of participation in the workplace • Discuss 7 habits of highly effective people • Communicate ideas through small group discussions and meetings • Demonstrate basic skills in data analysis	• Interactive Lecture • Appreciative Inquiry • Demonstration • Group work	• Psychological and behavioral Interviews • Performance Evaluation • Life Narrative Inquiry • Review of portfolios of evidence and third-party workplace reports of on-the-job performance. • Standardized assessment of character strengths and virtues applied	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
6. Present relevant information	6.1 Gather data/ information	• Lecture and discussion on: - Organisational protocols - Confidentiality and accuracy - Business mathematics and statistics - Legislation, policy and procedures relating to the conduct of evaluations • Reviewing data/ information	• Group discussion • Lecture • Demonstration • Role Play	• Oral evaluation • Written Test • Observation • Presentation	2 Hours
	6.2 Assess gathered data/ information	• Lecture and discussion on: - Data analysis techniques/ procedures - Organisational values, ethics and codes of conduct - Trends and anomalies • Computing business mathematics and statistics • Application of data analysis techniques	• Group discussion • Lecture • Demonstration • Role Play • Practical exercises	• Oral evaluation • Written Test • Observation • Presentation	3 Hours
	6.3 Record and present information	• Lecture and discussion on: - Reporting requirements to a range of audiences - Recommendations for possible improvements • Analysis and comparison of interim and final reports' outcomes • Reporting of data findings	• Group discussion • Lecture • Demonstration • Role Play • Practical exercises	• Oral evaluation • Written Test • Observation • Presentation	3 Hours
7. Practice Occupational Safety And Health Policies And Procedures	7.1 Identify OSH compliance requirements	• Discussion regarding: - Hierarchy of Controls - Hazard Prevention and Controls - Work Standards and Procedures - Personal Protective Equipment	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / • Questioning	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	7.2 Prepare OSH requirements for compliance	• Identification of required safety materials, tools and equipment • Handling of safety control resources	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / • Questioning	1 Hour
	7.3 Perform tasks in accordance with relevant OSH policies and procedures	• Discussion of General OSH Standards and Principles • Performing industry related work activities in accordance with OSH Standards	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / • Questioning	2 Hours
8. Exercise Efficient and Effective Sustainable Practices in the Workplace	8.1 Identify the efficiency and effectiveness of resource utilization	- Discussion on the process how Environmental Policies coherence is achieved • Discussion on Necessary Skills in response to changing environmental policies needs - Waste Skills - Energy Skills - Water Skills - Building Skills - Transport Skills - Material Skills	• Lecture • Group Discussion • Simulation • Demonstration	• Written Exam • Demonstration • Observation • Interviews / • Questioning	1 Hour
	8.2 Determine causes of inefficiency and/or ineffectiveness of resource utilization	• Discussion of Environmental Protection and Resource Efficiency Targets • Analysis on the Relevant Work Procedure	• Lecture • Group Discussion • Demonstration	• Written Exam • Demonstration • Observation • Interviews / • Questioning	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	8.3 Convey inefficient and ineffective environmental practices	• Identification of (re)training needs and usage of environment friendly methods and technologies • Identification of environmental corrective actions • Practicing Environment Awareness	• Lecture • Group Discussion • Role Play • Demonstration	• Written Exam • Demonstration • Observation • Interviews / • Questioning	1 Hour
9. Practice Entrepreneurial Skills in the Workplace	9.1 Apply entrepreneurial workplace best practices	• Case studies on Best entrepreneurial practices • Discussion on Quality procedures and practices • Case studies on Cost consciousness in resource utilization	• Case Study • Lecture/Discussion	• Case Study • Written Test • Interview	1 Hour
	9.2 Communicate entrepreneurial workplace best practices	• Discussion on communicating entrepreneurial workplace best practices	• Lecture/Discussion	• Written Test • Interview	1 Hour
	9.3 Implement cost-effective operations	• Case studies on Preservation, optimization and judicious use of workplace resources	• Case Study • Lecture/Discussion	• Case Study • Written Test • Interview	2 Hours

COMMON COMPETENCIES
<u>162</u> Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
1. Validate vehicle specification	1.1 Check body type of the vehicle	1.1.1 Enumerate the different kinds of vehicle 1.1.2 Explain the difference of each kind of vehicle 1.1.3 Identify the measuring points of the vehicle 1.1.4 Explain the procedures in measuring vehicle dimension and weight 1.1.5 Describe the different body shapes of the vehicle 1.1.6 Differentiate kinds of power train 1.1.7 Explain the function of each power train 1.1.8 Discuss occupational safety and health standard in checking the body type of a vehicle 1.1.9 Identify different kinds of vehicle 1.1.10 Measure vehicle dimensions and weight 1.1.11 Identify vehicle body shapes 1.1.12 Identify vehicle power train 1.1.13 Apply safety practices	• Lecture • Demonstration • Video presentation	• Written exam • Demonstrate	7 Hours
	1.2 Check vehicle engine type	1.2.1 Discuss the different kinds of engine 1.2.2 Enumerate the different kinds of fuel/energy system	• Lecture • Demonstration • Video presentation	• Written exam • Demonstrate	3 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		1.2.3 Describe the different engine components 1.2.4 Identify different kinds of engine 1.2.5 Identify different types of fuel/energy system 1.2.6 Identify different engine components			
	1.3 Check vehicle specifications	1.3.1 Inspect VIN plate of the vehicle 1.3.2 Verify vehicle specification 1.3.3 Check vehicle modifications and conversions 1.3.4 Inspect vehicle conversions 1.3.5 Explain different vehicle related regulations in the Philippine	• Lecture • Demonstration • Video presentation	• Written exam • Demonstrate	4 Hours
	1.4 Complete validation of vehicle specification	1.4.1 Explain verification of vehicle ownership using repair order and vehicle reference materials 1.4.2 Discuss procedures in accomplishing check sheet 1.4.3 Discuss submission of check sheet	• Lecture • Demonstration • Video presentation	• Written exam • Demonstrate	3 Hours
2. Move and position vehicle	2.1 Prepare vehicle for operation	2.1.1 Explain vehicle multi point inspection 2.1.2 Enumerate cockpit drill procedure 2.1.3 Initialize engine startup 2.1.4 Perform parking brake 2.1.5 Show vehicle operational procedures	• Lecture discussion • Demonstration • Video presentation • Workshop visit	• Demonstration • Written exam • Interview	16 hours
	2.2 Position vehicle	2.2.1 Determine workshop hazards	• Lecture • Demonstration	• Demonstration • Written exam	16 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		2.2.2 Discuss the procedure in avoiding workshop hazards 2.2.3 Define occupational health and safety standards 2.2.4 Move the vehicle 2.2.5 Explain workshop rules and regulations	• Video presentation	• Interview	
	2.3 Park and stop the vehicle	2.3.1 Explain parking rules and regulations 2.3.2 Park vehicle 2.3.3 Outline parking principles 2.3.4 Shut-off vehicle	• Lecture • Demonstration • Video presentation	• Demonstration • Written exam • Interview	8 hours
3. Utilize automotive tools	3.1 Prepare automotive tools	3.1.1 Identify and select automotive tools and attachments 3.1.2 Discuss inspection and selection procedures 3.1.3 Describe the defects and damages of automotive tools and attachments 3.1.4 Discuss OSHS in preparation of automotive tools 3.1.5 Prepare automotive tools and attachments	• Lecture • Demonstration • Visual aids • Videos	• Written examination • Interview • Demonstration • Practical examination	6 Hours
	3.2 Use automotive tools	3.2.1 Discuss the procedure in mounting attachments to automotive tools 3.2.2 Discuss the procedure in connecting the power supply to power tools 3.2.3 Discuss the procedure in operating the power tools 3.2.4 Discuss the utilization of hand tools	• Lecture • Demonstration • Visual aids • Videos	• Written examination • Interview • Demonstration • Practical examination	6 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		3.2.5 Identify PPEs 3.2.6 Discuss OSHS in using automotive tools 3.2.7 Use automotive tools 3.2.8 Use PPEs			
	3.3 Maintain automotive tools	3.3.1 Discuss the procedure in cleaning, checking for serviceability, and storing of automotive tools and attachments 3.3.2 Discuss the procedure in identifying and reporting defects and damages 3.3.3 Discuss the proper waste segregation 3.3.4 Demonstrate the proper maintenance of automotive tools 3.3.5 Demonstrate disposal of wastes	• Lecture • Visual aids • Videos	• Written examination • Demonstration	4 Hours
4. Perform mensuration and calculation	4.1 Select measuring instruments	4.1.1 Describe measuring instruments 4.1.2 Select measuring instruments 4.1.3 Inspect and calibrate measuring instruments 4.1.4 Report and return defective measuring instruments 4.1.5 Demonstrate safety practices	• Demonstration • Video presentation • Lecture Discussion • Workshop visit	• Demonstration • Written exam • Oral questioning	9 Hours
	4.2 Carry out measurements and calculation	4.2.1 Explain formulas for volume, areas, perimeters of plane and geometric figures 4.2.2 Explain the procedure in reading tools' limit of accuracy	• Demonstration • Video presentation • Lecture Discussion • Workshop visit	• Demonstration • Written exam • Oral questioning	29 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		4.2.3 Measure required automotive parts 4.2.4 Read tools' limit of accuracy 4.2.5 Inspect and calibrate measuring instruments			
	4.3 Maintain measuring instruments	4.3.1 Identify PPEs 4.3.2 Discuss cleaning procedures of measuring instruments 4.3.3 Enumerate steps in storing instruments 4.3.4 Wear PPEs 4.3.5 Clean measuring instrument tools 4.3.6 Re-inspect and re-calibrate measuring instruments	• Demonstration • Video presentation • Lecture Discussion	• Demonstration • Written exam • Oral questioning	5 Hours
5. Utilize workshop facilities and equipment	5.1 Perform pre-operation activities	5.1.1 Identify different areas of an automotive service facilities 5.1.2 Explain the preparation procedures of automotive service facilities 5.1.3 Enumerate different equipment in the automotive service facilities 5.1.4 Discuss the preparation procedures of equipment 5.1.5 Describe minor repairs in automotive facilities and equipment 5.1.6 Describe defective equipment 5.1.7 Identify reporting procedures for defective equipment	• Lecture • Demonstration • Video presentation • Workshop visit	• Demonstration • Written exam • Interview	9 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		5.1.8 Discuss OSHS practices related to the preparation of facilities and equipment 5.1.9 Prepare workshop facilities and equipment			
	5.2 Use facilities and equipment	5.2.1 Explain the operation of equipment according to operation manual 5.2.2 Describe how facilities are utilized according to workshop procedures 5.2.3 Explain how equipment performance is monitored following users' manual 5.2.4 Describe the monitoring of facilities functionalities following workplace procedures 5.2.5 Discuss how OSHS safety practices are applied	• Lecture • Demonstration • Video presentation • Workshop visit	• Demonstration • Written exam • Interview	5 Hours
	5.3 Conduct post-operation activities	5.3.1 Explain how workshop facilities are restored according to good housekeeping 5.3.2 Discuss tools and equipment are cleaned and stored according to good housekeeping 5.3.3 Explain wastes disposed following waste management procedure and OSHS 5.3.4 Enumerate the safety practices that are applied following OSHS	• Lecture • Demonstration • Video presentation • Workshop visit	• Demonstration • Written exam • Interview	5 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		5.3.5 Demonstrate preparation of report based on workshop standard procedure			
6. Prepare servicing parts and consumables	6.1 Identify parts and consumables	6.1.1 Familiarize parts & consumables 6.1.2 Identify indirect materials 6.1.3 Identify hazardous parts and consumables	• Lecture • Video presentation • Actual training	• Demonstration • Written exam • Interview	6 Hours
	6.2 Retrieve and withdraw parts and consumables	6.2.1 Familiarize requisition slip 6.2.2 Perform parts withdrawal procedure & recording 6.2.3 Validate parts and consumables according to quantity & specification 6.2.4 Perform safety precautions	• Lecture • Video presentation • Actual training	• Demonstration • Written exam • Interview	4 Hours
	6.3 Complete work process	6.3.1 Segregate parts to be returned to customers 6.3.2 Segregate parts & consumables for proper disposal or recycling according to 3Rs and RA 6969 6.3.3 Wear PPE's	• Lecture • Video presentation • Actual training	• Demonstration • Written exam • Interview	3 Hours
7. Prepare vehicle for servicing and releasing	7.1 Receive vehicle	7.1.1 Identify different areas of an automotive service facility 7.1.2 Explain the receiving procedures of automotive service facilities 7.1.3 Explain the checklisting procedures of automotive service facilities 7.1.4 Describe minor repairs in automotive facilities and equipment	• Lecture • Demonstration • Video presentation • Workshop visit	• Role-playing • Written exam • Interview	6 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		7.1.5 Discuss OSHS practices related to the preparation of facilities and equipment 7.1.6 Prepare workshop facilities and equipment			
	7.2 Prepare vehicle for servicing	7.2.1 Prepare vehicle for servicing 7.2.2 Explain the preparation procedures of automotive service facilities 7.2.3 Demonstrate the procedure in installing protective covers 7.2.4 Explain the concept of the locator blocks 7.2.5 Classify the type of vehicle repair based on the Repair Order	• Lecture • Demonstration	• Role-playing • Written Exams • Oral Exams	5 Hours
	7.3 Prepare vehicle for releasing	7.3.1 Use the repair order to identify work performed 7.3.2 Apply quality control measures on work done 7.3.3 Operate vehicle for transfer and release	• Lecture • Demonstration	• Role-Playing • Written Exams • Oral Exams	3 Hours

CORE COMPETENCIES
213 Hours

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
1. Service manual air-conditioner system	1.1 Prepare to inspect and service manual air-conditioner system	• Discuss job requirements • Enumerate source of servicing information • Explain procedures in interpreting servicing information • Explain hazards associated with work • Identify tools, equipment and materials • Discuss procedures of checking tools and equipment • Discuss OSHS • Prepare to inspect and service manual air-conditioner system	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	**(30 Hrs.)** 7 hrs
	1.2 Service manual air-conditioner system and components	• Discuss visual checking of system • Explain system performance tests • Enumerate manual air-conditioning system services • Discuss post-service testing • Explain reporting of findings • Discuss OSHS • Service manual air-conditioner system and components	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	16 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
	1.3 Complete work processes	• Discuss final inspection • Enumerate procedure of turning-over of vehicle. • Explain 5S of Good Housekeeping • Explain waste management • Discuss checking and storing procedures • Explain workplace documentation • Complete work processes	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	7 hrs
2. Diagnose and repair manual air-conditioner system	2.1 Prepare to diagnose and repair manual air conditioning system	• Discuss job requirements • Explain procedures of sourcing and interpretation of diagnostic information • Explain hazards associated with works • Identify non-serviceable tools • Explain procedures of reporting and checking of non-serviceable tools and availability of tools • Discuss OSHS • Prepare to diagnose and repair manual air conditioning system	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	**(30 Hrs)** 5 hrs
	2.2 Diagnose manual air conditioning system	• Discuss troubleshooting and diagnostic test procedures • Identify faults and its causes • Explain reporting of findings	• Lecture • Demonstration • Visual aids • Videos	• Written examination • Interview • Demonstration • Practical examination	16 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Discuss procedure on accomplishing of checklist • Discuss OSHS • Diagnose manual air conditioning system	• Power point Presentation		
	2.3 Repair manual air conditioning system	• Discuss procedures on sourcing and interpreting of repair information • Explain repairs and component replacement and adjustments procedures • Explain recharging procedure of system • Discuss post-repair testing • Discuss OSHS • Repair manual air conditioning system	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	5 hrs
	2.4 Complete work processes	• Discuss final inspection • Enumerate procedure of turning-over of vehicle. • Explain 5S of Good Housekeeping • Explain wastes management • Discuss procedures of checking and storing of tools and equipment • Discuss workplace documentation • Complete work processes	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	2 hrs
4.Repair manual air-conditioner	4.1 Prepare to repair manual air	• Discuss job requirements	• Lecture • Demonstration	• Written examination • Interview	**(30 Hrs.)** 7 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
compressor magnetic clutch	conditioner compressor magnetic clutch	• Explain procedures of sourcing and interpreting on dismantling information • Identify hazards associated with work • Discuss serviceable and non-serviceable tools • Discuss OSHS • Prepare to repair manual air conditioner compressor magnetic clutch	• Visual aids • Videos • Power point Presentation	• Demonstration • Practical examination	
	4.2 Dismantle and evaluate magnetic clutch components	• Identify magnetic clutch • Discuss cleaning procedure of components • Identify out of standard parts • Enumerate uses of tools • Discuss OSHS • Dismantle and evaluate magnetic clutch components	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	8 hrs
	4.3 Install magnetic clutch components of compressor	• Identify magnetic clutch components • Discuss installation procedure • Explain post-installation testing • Discuss OSHS • Install magnetic clutch components of compressor	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	8 hrs
	4.4 Complete work processes	• Explain final inspection • Discuss quality control • Discuss 5S of Good Housekeeping	• Lecture • Demonstration • Visual aids • Videos	• Written examination • Interview • Demonstration • Practical examination	7 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Illustrate waste management • Explain checking and restoring of tools • Discuss workplace documentation • Complete work processes	• Power point Presentation		
5. Diagnose and repair ignition system	5.1 Prepare to diagnose and repair ignition system	• Discuss job requirements • Explain procedures of sourcing and interpreting diagnostic information • Identify diagnostic symptoms • Enumerate analysis procedure on diagnostic symptoms • Discuss hazards associated with works • Explain procedures of selecting and checking of tools and materials • Identify serviceability and non-serviceable tools and equipment • Explain procedures of checking and reporting of tools and availability of materials • Prepare to diagnose and repair ignition system	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	**(30 Hrs.)** 7 hrs
	5.2 Diagnose ignition system	• Discuss diagnostic test • Explain inspection procedure	• Lecture • Demonstration • Visual aids	• Written examination • Interview • Demonstration	8 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Discuss procedures of comparing inspection results • Identify faults and its causes • Explain procedure of reporting of findings or recommendations for necessary repairs and adjustments • Discuss OSHS • Diagnose ignition system	• Videos • Power point Presentation	• Practical examination	
	5.3 Repair ignition system	• Explain procedures of sourcing and interpreting repair information • Discuss procedure of analyzing repair options • Enumerate procedures of selecting and checking repair tools and materials • Discuss procedures of repairs and component and adjustments • Explain post-repair testing • Discuss OSHS • Repair ignition system	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	8 hrs
	5.4 Complete work processes	• Explain final inspection • Discuss quality control • Discuss 5S of Good Housekeeping • Illustrate waste management • Explain checking and restoring of tools	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	7 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Discuss workplace documentation • Complete work processes			
6. Diagnose and repair starting system	6.1 Prepare to diagnose and repair starting system	• Discuss job requirements • Explain procedures of sourcing and interpreting diagnostic information • Identify diagnostic symptoms • Enumerate analysis procedure on diagnostic symptoms • Discuss hazards associated with works • Explain procedures of selecting and checking of tools and materials • Identify serviceability and non-serviceable tools and equipment • Explain procedures of checking and reporting of tools and availability of materials • Prepare to starting system	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	**(31 Hrs.)** 7.5 hrs
	6.2 Prepare to diagnose and repair starting system	Discuss and explain the following: • Industry criteria • Component faults of starting system • Mensuration • Inspection procedure	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	8 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Arithmetic operation • Fundamentals of electricity and magnetism • Principles of combustion, pressure and temperature • Pre-heating system operation for diesel engine • Chemistry (battery solutions and chemical reactions) • Hazards associated with the operations • Risk management • Fundamentals of electricity • Procedure in accomplishing checklist • OSHS • Wearing of PPEs • 3Rs • 5S of Good Housekeeping Practices Practical: • Prepare to diagnose and repair starting system			
	6.3 Repair starting system	Discuss and explain the following:	• Lecture • Demonstration • Visual aids • Videos	• Written examination • Interview • Demonstration • Practical examination	8 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Sourcing and interpretation of repair information • Repair symptoms • Repair options • Repair tools, equipment, and materials • Replacements and adjustments of components • Post-repair testing • Fundamentals of electricity and magnetism • Hazards associated with the operations • Risk Management • Procedure in accomplishing checklists • Numerical information • OSHS • Wearing of PPEs • 3Rs • 5S Practical: • Repair starting system	• Power point Presentation		
	6.4 Complete work processes	Discuss and explain the following: • OSHS • Wearing of PPEs • Waste management	• Lecture • Demonstration • Visual aids • Videos	• Written examination • Interview • Demonstration • Practical examination	7.5 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• 5S of good housekeeping • 3Rs • Final inspection procedure • Vehicle turn-over procedure • Accomplishment of workplace documents Practical: • Complete work processes	• Power point Presentation		
7. Diagnose and repair charging system	7.1 Prepare to diagnose and repair charging system	Discuss and explain the following: • Different job requirements • Diagnostic information • Troubleshooting guide • Industry criteria • Tools, equipment, and materials in diagnosing and repairing charging system • Procedure in accomplishing forms • Types of Alternator Pulley • Identifying hazards associated with the operation • Risk management • OSHS	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	**(31 Hrs.)** 7.5 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Waste management • Tools and measuring equipment Practical: • Prepare to diagnose and repair charging system			
	7.2 Diagnose charging system	Discuss and explain the following: • Industry criteria • Component faults of charging system • Mensuration • Inspection procedure • Arithmetic operation • Battery tester • Fundamentals of Electromagnetism • Fundamental of electricity • Procedure in accomplishing checklists • OSHS • Wearing of PPEs • 3Rs • 5S Practical: • Diagnose charging system	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	8 hrs
	7.3 Repair charging system	Discuss and explain the following:	• Lecture • Demonstration • Visual aids	• Written examination • Interview • Demonstration	8 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Sourcing and interpretation of repair information • Repair options • Repair tools, equipment, and materials • Replacements and adjustments of components • Post-repair testing • Fundamentals of electricity and magnetism • Hazards associated with the operations • Risk Management • Mensuration on alternator charging • Resistance checking • Diodes Test • Procedure in accomplishing checklists • OSHS • Wearing of PPEs • 3Rs • 5S Practical: • Repair charging system	• Videos • Power point Presentation	• Practical examination	
	7.4 Complete work processes	Discuss and explain the following: • OSHS	• Lecture • Demonstration • Visual aids	• Written examination • Interview • Demonstration	7.5 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Wearing of PPEs • Waste management • 5S of good housekeeping • 3Rs • Final inspection procedure • Vehicle turn-over procedure • Accomplishment of workplace documents Practical: • Complete work processes	• Videos • Power point Presentation	• Practical examination	
8. Diagnose and repair body electrical system	8.1 Prepare to diagnose and repair body electrical system	Discuss and explain the following: • Different job requirements • Diagnostic information • Troubleshooting guide • Industry criteria • Tools, equipment, and materials in diagnosing and repairing body electrical system • Procedure in accomplishing forms • Identifying hazards associated with the operation • Risk management	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	**(31 Hrs.)** 7.5 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Fundamentals of electricity and electronics • OSHS • Waste management • Tools and measuring equipment Practical: • Prepare to diagnose and repair body electrical system			
	8.2 Diagnose body electrical system	Discuss and explain the following: • Electrical principles ▪ Current, voltage, resistance and power • Series circuits • Parallel circuits • Series parallel circuits • Ohm's law • Diagnostic tests • Faults and its causes • Electrical troubleshooting guide • Industry criteria • Faults of body electrical system • Manual air-conditioner system • Lighting • Wiper operation • Door locks	• Lecture • Demonstration • Visual aids • Videos • Power point Presentation	• Written examination • Interview • Demonstration • Practical examination	8 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Window regulator • Horn • Accessories • Mensuration • Inspection procedure • Arithmetic operation • Battery tester • Fundamentals of electromagnetism • Fundamental of electricity • Techniques for reading and interpreting technical information, including circuit types, diagrams and symbols • Procedures for using and operating electrical test equipment • Procedure in accomplishing checklists • OSHS • Wearing of PPEs • 3Rs • 5S Practical: • Diagnose body electrical system			
	8.3 Repair body electrical system	Discuss and explain the following:	• Lecture • Demonstration • Visual aids	• Written examination • Interview • Demonstration	8 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• Sourcing and interpretation of repair information • Repair options • Repair tools, equipment, and materials • Replacements and adjustments of components • Soldering technique • Post-repair testing • Fundamentals of electronics and electricity • Hazards associated with the operations • Risk Management • Resistance checking • Procedure in accomplishing checklists • OSHS • Wearing of PPEs • 3Rs • 5S Practical: • Repair body electrical system	• Videos • Power point Presentation	• Practical examination	
	8.4 Complete work processes	Discuss and explain the following: • OSHS • Wearing of PPEs • Waste management	• Lecture • Demonstration • Visual aids • Videos	• Written examination • Interview • Demonstration • Practical examination	7.5 hrs

Unit of Competency	Learning Outcome	Learning activities	Methodology	Methods of Assessment	Nominal Duration
		• 5S of good housekeeping • 3Rs • Final inspection procedure • Vehicle turn-over procedure • Accomplishment of workplace documents Practical: • Complete work processes	• Power point Presentation		

3.2 TRAINING DELIVERY

1. **The delivery of training shall adhere to the design of the curriculum. Delivery shall be guided by the principles of competency-based TVET.**

    a. Course design is based on competency standards set by the industry or recognized industry sector; (Learning system is driven by competencies written to industry standards)
    b. Training delivery is learner-centered and should accommodate individualized and self-paced learning strategies;
    c. Training can be done on an actual workplace setting, simulation of a workplace and/or through adoption of modern technology.
    d. Assessment is based in the collection of evidence of the performance of work to the industry required standards;
    e. Assessment of competency takes the trainee's knowledge and attitude into account but requires evidence of actual performance of the competency as the primary source of evidence.
    f. Training program allows for recognition of prior learning (RPL) or current competencies;
    g. Training completion is based on satisfactory performance of all specified competencies.

2. **The competency-based TVET system recognizes various types of delivery modes, both on-and off-the-job as long as the learning is driven by the competency standards specified by the industry. The following training modalities and their variations/components may be adopted singly or in combination with other modalities when designing and delivering training programs:**

    2.1 School/Institution- Based:

    - Dual Training System (DTS)/Dualized Training Program (DTP) which contain both in-school and in-industry training or fieldwork components. Details can be referred to the Implementing Rules and Regulations of the DTS Law and the TESDA Guidelines on the DTP;

    - Distance learning is a formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may employ correspondence study, audio, video, computer technologies or other modern technology that can be used to facilitate learning and formal and non-formal training. Specific guidelines on this mode shall be issued by the TESDA Secretariat.

    - Supervised Industry Training (SIT) or on-the-job training (OJT) is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies as prescribed in the training regulations. It is imperative that the deployment of trainees in the workplace is

adhered to training programs agreed by the institution and enterprise and status and progress of trainees are closely monitored by the training institutions to prevent opportunity for work exploitation.

- The classroom-based or in-center instruction uses of learner-centered methods as well as laboratory or field-work components.

2.2 Enterprise-Based:

- **Formal Apprenticeship** – Training within employment involving a contract between an apprentice and an enterprise on an approved apprenticeable occupation.

- **Informal Apprenticeship** - is based on a training (and working) agreement between an apprentice and a master craftsperson wherein the agreement may be written or oral and the master craftsperson commits to training the apprentice in all the skills relevant to his or her trade over a significant period of time, usually between one and four years, while the apprentice commits to contributing productively to the work of the business. Training is integrated into the production process and apprentices learn by working alongside the experienced craftsperson.

- **Enterprise-based Training**- where training is implemented within the company in accordance with the requirements of the specific company. Specific guidelines on this mode shall be issued by the TESDA Secretariat.

2.3 Community-Based – short term program conducted by non-government organizations (NGOs), LGUs, training centers and other TVET providers which are intended to address the specific needs of a community. Such programs can be conducted in informal settings such as barangay hall, basketball courts, etc. These programs can also be mobile training program (MTP).

3.3 TRAINEE ENTRY REQUIREMENTS

Trainees or students who would like to enroll in this program must possess the following requirements:

- A holder of National Certificate in Automotive Servicing NC I;
- Basic communication skills;
- Basic mathematical skills;
- Basic computer skills

This list does not include specific institutional requirements such as educational attainment, appropriate work experience, and others that may be required of the trainees by the school or training center delivering the TVET program.

3.4 LIST OF TOOLS, EQUIPMENT, AND MATERIALS

AUTOMOTIVE SERVICING (ELECTRICAL REPAIR) NC II

Recommended list of tools, equipment and materials for the training of 25 trainees for Automotive Servicing (Electrical Repair) NC II.

Up-to-date tools, materials, and equipment of equivalent functions can be used as alternatives. This also applies in consideration of community practices and their availability in the local market.

A. FULL QUALIFICATION

TOOLS	
QTY	**DESCRIPTION**
5 sets	Basic hand tools (Mechanical pliers, Screw driver, socket wrench, spanner, hammer)
1 set	AC clutch coil puller
1 set	Alternator bearing puller
5 pc	Snap ring plier
5 pc	Straight hexagon wrench
5 pcs.	Torque wrench
5 pcs.	Feeler gauge
2 pcs	Service type Thermometer (10 to 100 degrees C)
1 pc	hygrometer
2 pcs	Timing light
1 pc	Bench vice
2 pcs	Belt tension gauge
2 pcs	Wire splicer
5 sets	Feeler gauge
2 sets	Spark plug wrench (14mm,16mm,21mm)
1 pc	Vernier Caliper
1 pc	Bench vice (6”)
1 set	Jumper cable (400amph)
2 pcs	Trouble light LED (15w)

TOOLS	
QTY	**DESCRIPTION**
1 unit	Battery/Load tester
1 pc	Soldering iron (60-100w)
4 pc	Extension/power cable (10m)
1 pc	Impact wrench
1 roll per size	Electrical wire(gauge10,12,14,16)
1 pc	Clamp Type Ammeter

EQUIPMENT	
QTY	**DESCRIPTION**
2 units *1 gasoline type* *1 diesel type*	Training vehicle with manual air-conditioning system (model 90's and up)
5 units	Alternator assembly
5 units	AC compressor assembly
1 set	AC Refrigerant recovery, recharging and recycling machine
5 pcs.	Digital multitester
5 pcs	Soldering iron
2 pcs.	Crocodile jack (or equivalent)
5 pcs.	Trouble light (or equivalent)
1 pc.	Belt tension gauge
2 pcs.	Vernier caliper
2 pcs.	Dial gauge w/ magnetic stand
2 pcs.	Spring scale
5 sets	Manifold charging gauge with hose
2 sets	Halogen leak detector
1 unit	Vacuum pump
8 units	Jack stand
2 pcs	Creeper
2 units	Working table (4ft x 2ft- wood)
2 units	Wheel wedge
1 unit	Graduated cylinder
5 pcs	Soldering stand
1 unit	Vehicle lifter
1 unit	Battery charger

MATERIALS	
QTY	**DESCRIPTION**
25 pairs	Cotton gloves
50 pc	Cotton rags
1 roll	Soldering lead
5 cans	Non-conductive electrical connector spray cleaner
50 pc	Eye terminal
50 pc	Male terminal
50 pc	Female terminal
5 rolls	Electrical tape
10m/type	Automotive wire ▪ #10 awg ▪ #12 awg ▪ #14 awg ▪ #16awg
20 pc	Alligator clip - Medium
20 pc	O- ring (assorted sizes and thickness)
50 pc	Cotton Rags
40 kg	Refrigerant, 134A
1 L	Compressor oil
5 pc	Shaft seal (assorted)
1 can	Nitrogen gas
1 pc	Desiccant materials
2 rolls	Butyl tape
25 pc	**PPEs** - Face mask - Face shield* - Goggles - Gloves - Coverall suit - Safety shoes
1 gallon	70% Alcohol*
1 tube (100g)	Grease
250 ml	Penetrating oil
250 ml	Contact cleaner
1 m	Shrinkable tube (5 mm)
1 can	Soldering paste
1 L	Cleaning agent
1 L	Distilled water
1 pc	Heat gun
5 pc/grit	Sand paper Grit- 600,1000
1 pack	Cable tie (8”)
1 box	Carbon brush
5 pc/type	Switches ▪ Toggle switch (6 terminal) ▪ Push pull switch ▪ Push button switch
2 pc	Relays (30-60 Amp)12 volts
2 pc	Fusible link for battery
2 pc/type	Bulbs (12 volts)

MATERIALS	
QTY	**DESCRIPTION**
	▪ Double contact ▪ Single contact ▪ Headlight bulb ▪ Peanut bulb
5pcs/amp	Fuses ▪ 7.5 Amp ▪ 10 Amp ▪ 15 Amp ▪ 20 Amp ▪ 30 Amp
2 sets	Car protective equipment (CPE)- all UCs and 3 Qualifications • Steering wheel cover • Fender cover • Shift knob cover • Floor mat • Seat cover

Note: Access to and use of equipment/facilities can be provided through cooperative arrangements or MOA with other partner/companies.*these materials will be required during the pandemic as mandated by the existing guidelines issued by the government in line with protection against virus and other infectious diseases for trainees and trainers

B. Per COC

COC 1 – SERVICE AUTOMOTIVE MANUAL AIR-CONDITIONING SYSTEM

TOOLS	
QTY	**DESCRIPTION**
2 sets	Basic hand tools
2 pcs	Straight hexagon wrench
2 pcs	Torque wrench (Required torque 100kg cm)
2 pcs	Feeler gauge
2 pcs	Service type thermometer
2 pcs	Multi-tester

EQUIPMENT	
QTY	**DESCRIPTION**
1 set	Recovery and recycling machine
2 pcs	Manifold charging gauge with hose
1 set	Halogen leak detector
1 pc	Hygrometer
1 unit	Pressure washer
1 unit	Vacuum pump
2 pcs	Service trouble lamp
1 set	Refrigerant charging gauge with hose
1 unit	Graduated cylinder

MATERIALS	
QTY	**DESCRIPTION**
10 pcs	O- ring (assorted sizes and thickness)
25 pcs	Rags
20 kg	Refrigerant
0.5 L	Compressor oil
5 pcs	Shaft seal
1 cylinder	Nitrogen gas
1 pc	Desiccant materials
1 roll	Butyl tape
1 set	Car Protective Equipment (CPE)
2 rolls	Insulation tape
1 can	Penetrating oil
5 sets	Cleaning agent ▪ Cleaning solution ▪ Water ▪ Brush ▪ Soap suds
25 pcs	**PPEs** ▪ Face mask ▪ Face shield* ▪ Goggles ▪ Gloves ▪ Coverall suit ▪ Safety shoes
1 gallon	70% Alcohol*

Note: Access to and use of equipment/facilities can be provided through cooperative arrangements or MOA with other partner/companies. *these materials will be required during the pandemic as mandated by the existing guidelines issued by the government in line with protection against virus and other infectious diseases for trainees and trainers

COC 2 - SERVICE AUTOMOTIVE ELECTRICAL SYSTEM

TOOLS	
QTY	**DESCRIPTION**
3 set	Basic hand tools
3 pc	Feeler or thickness gauge
3 pc	Multi-tester (analog and digital)
2 set	Spark-plug wrench
3 pc	Torque wrench
5 pc	Digital multitester
1 pc	Bench vice
1 pc	Clamp Type Ammeter (60-100Amp) (digital and analog)
1 set	Jumper cable
5 pc	Soldering iron
5 pc	Soldering stand
4 pc	Extension/power cable (10m)
1 pc	Desoldering tool
1 pc	Vernier caliper
1pc/type	Special Service Tools (SST) - Pulley removal - Belt tension gauge - Alternator bearing puller
1 pc	Impact wrench
1 roll/size	Electrical wire(gauge10,12,14,16)
2 pc	Hydrometer
2 pc	Wire splicer
1 pc	Clamp Type Ammeter

EQUIPMENT	
QTY	**DESCRIPTION**
2 pc	Timing light
3 pc	Service trouble light
1 unit	Vehicle lifter
2 pc	Crocodile jack
8 unit	Jack stand
2 pc	Creeper
1 unit	Battery charger
1 unit	Battery load tester
2 unit	Working table

MATERIALS	
QTY	**DESCRIPTION**
25 pc	Cotton rags
1 tube (100g)	Grease
5 rolls	Electrical tape
250ml	Contact cleaner
1 roll	Soldering lead
1 can	Soldering paste
10m/type	Automotive wire ▪ #10 awg ▪ #12 awg ▪ #14 awg ▪ #16awg
1 pack	Cable tie (8”)
1 box	Carbon brush
1 set	CPE
25 pc	PPEs ▪ Face mask ▪ Face shield* ▪ Goggles ▪ Gloves ▪ Coverall suit ▪ Safety shoes
1 gallon	70% Alcohol*
1 set	First-Aid Kit
1 m	Shrinkable tube fuse for bulbs
2 pc	Fusible link for battery
2 pc/type	Bulbs (12 volts) ▪ Double contact ▪ Single contact ▪ Headlight bulb ▪ Peanut bulb
5pcs/amp	Fuses ▪ 7.5 Amp ▪ 10 Amp ▪ 15 Amp ▪ 20 Amp ▪ 30 Amp
2 pc	Relays (30-60 Amp)12 volts
5 pc/type	Switches ▪ Toggle switch (6 terminal) ▪ Push pull switch ▪ Push button switch
50 pc	Eye terminal
50 pc	Female terminal
50 pc	Male terminal

Note: Access to and use of equipment/facilities can be provided through cooperative arrangements or MOA with other partner/companies. *these materials will be required during the pandemic as mandated by the existing guidelines issued by the government in line with protection against virus and other infectious diseases for trainees and trainers

3.5 TRAINING FACILITIES

AUTOMOTIVE SERVICING (ELECTRICAL REPAIR) NC II

The automotive workshop must be made of reinforced concrete or steel structure. The size must be suited on the requirements of the competencies. The class size of 25 students/trainees is reserved for the lecture room and the practical demonstration area for carrying out servicing of minor automotive parts. Most of the learning activities such as on-vehicle servicing is performed in the workshop.

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	GRAND TOTAL AREA IN SQ. METERS
A. Building (permanent)			**130.00**
Lecture Room	5x6	30	30.00
Laboratory/Workshop Area		2 per student	50.00
Tool room & S/M storage area		20	20.00
Learning resource area	5x4	20	20.00
Wash area/comfort room (male & female)		10	10.00
TOTAL			**130.00**

NOTE: Access to and use of equipment /facilities can be provided through cooperative arrangements or MOA with other partner- companies/institutions.

3.6 TRAINER'S QUALIFICATIONS FOR AUTOMOTIVE SERVICING (ELECTRICAL REPAIR) NC II

NEW TRAINERS

- Holder of National TVET Trainers Certificate (NTTC) Level 1 in Automotive Servicing (Electrical Repair) NC II
- Must have at least 1-year industry experience in automotive servicing for the last 3 years

EXISTING TRAINERS

- Holder of National TVET Trainers Certificate (NTTC) Level 1 in Automotive Servicing (Electrical Repair) NC II
- Must have industry immersion of 40 hours annually (industry training which includes structured training program inclusive of hands-on activities and observation in a workshop, and training certificates with number of hours)

3.7 INSTITUTIONAL ASSESSMENT

Institutional Assessment is gathering of evidences to determine the achievements of the requirements of the qualification to enable the trainer make judgement whether the trainee is competent or not competent.

SECTION 4 ASSESSMENT AND CERTIFICATION ARRANGEMENT

Competency Assessment is the process of collecting evidence and making judgments whether competency has been achieved. The purpose of assessment is to confirm that an individual can perform to the standards expected at the workplace as expressed in relevant competency standards.

The assessment process is based on evidence or information gathered to prove achievement of competencies. The process may be applied to a full qualification or employable unit(s) of competency in partial fulfillment of the requirements of the national qualification.

4.1. NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

4.1.1 A National Certificate (NC) is issued when a candidate has demonstrated competence on all units of competency in a qualification with a promulgated Training Regulations.

4.1.2 A Certificate of Competency (COC) is issued by the Authority to individuals who were assessed as competent in a single unit or cluster of related units of competency.

COC 1 – SERVICE AUTOMOTIVE MANUAL AIR-CONDITIONING SYSTEM

- Service manual air-conditioner system
- Diagnose and repair manual air-conditioner system
- Repair manual air-conditioner compressor magnetic clutch

COC 2 - SERVICE AUTOMOTIVE ELECTRICAL SYSTEM

- Diagnose and repair ignition system
- Diagnose and repair starting system
- Diagnose and repair charging system
- Diagnose and repair body electrical system

4.1.3 Upon accumulation of the COCs acquired, an individual shall be issued the corresponding National Certificate for the Qualification.

4.1.4 Individuals wanting to be certified will have to be assessed in accordance with the requirements identified in the relevant unit/s of competency.

4.1.5 Current holders of National Certificate (NC) in **AUTOMOTIVE SERVICING NC II** shall have their certificates renewed and converted to the amended TR provided he/she has accumulated at least 2 years (for the last five years) work experience, practicing the competencies prescribed in his/her certificate. A Certificate of Employment and Job Description must be provided as proof.

He/she must be a holder of National Certificate in the amended Automotive Servicing NC I.

4.1.6 Current holders of Certificate of Competency (COC) in **AUTOMOTIVE SERVICING NC II**, shall have to undergo assessment in the amended Training Regulations upon expiration of their Certificates. He or she must be a holder of National Certificate in the amended Automotive Servicing NC I.

4.1.7 Current holders of NTTC Level I in **AUTOMOTIVE SERVICING NCII** shall have their NCII converted to the amended TR provided that they have forty-eight (48) hours industry immersion within the last two (2) years. He or she must be a holder of National Certificate in the amended Automotive Servicing NC I.

4.1.8 The industry shall determine assessment and certification requirements for each qualification with promulgated Training Regulations. It includes the following:

a. Entry requirements for candidates
b. Evidence gathering methods
c. Qualification requirements of competency assessors
d. Specific assessment and certification arrangements as identified by industry

4.1.9 Recognition of Prior Learning (RPL). Candidates who have gained competencies through informal training, previous work or life experiences may apply for recognition in a particular qualification through a recognition/assessment process.

4.1.10 A candidate who fails the assessment for two (2) consecutive times shall be advised to go through a refresher course before taking another assessment.

4.2. COMPETENCY ASSESSMENT REQUISITE

4.2.1 **Self-Assessment Guide**. The self-assessment guide (SAG) is accomplished by the candidate prior to actual competency assessment. SAG is a pre-assessment tool to help the candidate and the assessor determine what evidence is available, where gaps exist, including readiness for assessment.

This document can:

a) Identify the candidate's skills and knowledge
b) Highlight gaps in candidate's skills and knowledge
c) Provide critical guidance to the assessor and candidate on the evidence that need to be presented

d) Assist the candidate to identify key areas in which practice is needed or additional information or skills that should be gained prior to assessment

4.2.2 **Accredited Assessment Center.** Only Assessment Center accredited by TESDA is authorized to conduct competency assessment. Assessment centers undergo a quality assured procedure for accreditation before they are authorized by TESDA to manage the assessment for National Certification.

4.2.3 **Accredited Competency Assessor**. Only accredited competency assessor is authorized to conduct assessment of competence. Competency assessors undergo a quality assured system of accreditation procedure before they are authorized by TESDA to assess the competencies of candidates for National Certification.

COMPETENCY MAP
AUTOMOTIVE SERVICING (ELECTRICAL REPAIR) NC II

ANNEX A

BASIC COMPETENCY	Receive and respond to workplace communication	Participate in workplace communication	Lead workplace communication	Utilize specialized communication skill	Manage and sustain effective communication strategies
	Work with others	Work in a team environment	Lead small teams	Develop and lead teams	Manage and sustain high performing teams
	Solve/address routine problems	Solve/address general workplace problems	Apply critical thinking and problem solving techniques in the workplace	Perform higher-order thinking processes and apply techniques in the workplace	Evaluate higher order thinking skills and adjust problem solving techniques
	Enhance self-management skills	Develop career and life decisions	Work in a diverse environment	Contribute to the practice of social justice in the workplace	Advocate strategic thinking for global citizenship
	Support innovation	Contribute to workplace innovation	Propose methods of applying learning and innovation in the organization	Manage innovative work instructions	Incorporate innovation into work procedures
	Access and maintain information	Present relevant information	Use information systematically	Manage and evaluate usage of information	Develop systems in managing, and maintaining information
	Follow occupational safety and health policies and procedures	Practice occupational safety and health policies and procedures	Evaluate occupational safety and health work practices	Lead in improvement of occupational safety and health program, policies and procedures	Manage implementation of OSH programs in the workplace
	Apply environmental work standards	Exercise efficient and effective sustainable practices in the workplace	Evaluate environmental work practices	Lead towards improvement of environmental work programs, policies and procedures	Manage implementation of environmental programs in the workplace
	Adopt entrepreneurial mindset in the workplace	Practice entrepreneurial skills in the workplace	Facilitate entrepreneurial skills for micro-small-medium enterprises (MSMEs)	Sustain entrepreneurial skills	Develop and sustain a high-performing enterprise

COMMON COMPETENCY

Apply appropriate sealant/adhesive	Move and position vehicle	Perform mensuration and calculation	Read, interpret and apply specifications and manuals
Use and apply lubricants/coolants	Perform shop maintenance	Validate vehicle specification	Utilize automotive tools
Utilize workshop facilities and equipment	Prepare servicing parts and consumables	Prepare vehicle for servicing and releasing	Perform job estimates
Interpret/ draw technical drawing	Practice health, safety and environment procedures	Inspect technical quality of work	Maintain quality systems
Provide work skill instructions	Identify and select original automotive parts and products	Read & Interpret Engineering Drawings	Observe Quality Systems
Perform Periodic Maintenance			

CORE COMPETENCY

Prepare undamaged surface for painting	Apply and remove masking	Spray solid color paints	Perform polishing	Interpret Technical Manual Specification of Engine Components
Disassemble Engine Block and Sub-Assemblies, Checks Tolerances and Components	Disassemble Engine Sub-Assemblies/Cylinder Heads and Check Components	Carry Out Pre-Repair Operations on Engine Components	Inspect Engine Components and Determine Preferred Action	Carry Out Machining Operations
Set, Operate and monitor Specialized Machines	Use and Maintain Measuring Instrument	Assemble Engine Block and Sub-Assemblies, Check Tolerances and Carry Out Relevant Testing	Assemble Engine/Cylinder Heads, Check Tolerances and Carry Out Relevant Testing Procedures	Prepare Vehicle Body for Repair
Repair Body Panel	Replace Damaged Parts with Pre-Fabricated Parts	Service motorcycle/small engine system	Service Electrical System	Service Chassis
Overhaul Motorcycle/Small Engine	Perform Pearl Color Matching	Spray Three-Stage Pearl or Mica Color Paint	Manufacture and Develop Corebox for Shell Core Sand	Develop and Manufacture Gear, Conveyor Screw And Propeller Patterns
Develop Gravity Die Casting Mold	Operate Melting Furnaces (Non lectric)	Operate Cupola Melting Furnaces	Operate Electric Induction Melting Furnaces	Fettle and Trim Metal Castings/Forgings
Perform Refractory Installation and Repair	Prepare & Mix Sand for Metal Molding and Coremaking	Produce Molds by Hand (Jobbing)	Produce Cores by Hand (Jobbing)	Operate Sand Molding Machines
Operate Sand Core Making Machines	Pour Molten Metal to Molds	Assemble Mechanical Assemblies using Jigs/Fixtures	Mount/Install Brake and Fuel Systems	Mount/Install Power Drive System

Mount/Install Suspension Drive Train	Install/Fit out Trim Parts/ and Assemblies	Perform Final Engine Run	Perform Wheel Alignment Operations	Install/Fit Out Electrical Parts to Engine Assembly
Install/fit Out Electrical Parts and Electronic Units to Body Interior Compartment	Install/Fit Out Electrical Parts and Electronic Units to Dash Instrument Panel	Install/Fit Out Electrical Parts to Exterior and Engine Compartment	Install/Fit Out Audio and Video Systems	Perform Headlight Focus Aiming Operations
Prepare Molds for Composites Production	Prepare Materials for Formulae	Assemble Materials and Equipment for Production	Operate Injection Molding Equipment	Operate Blow Molding Equipment
Monitor Process Operations	Finish Products and Components	Perform Engineering Measurement	Perform Precision Mechanical Measurement	Calibrate Measuring Equipment
Select and Control Inspection Processes and Procedures	Perform Inspection	Perform Basic Statistical Quality Control	Use Improvement Processes in Team Activities	Perform Pre-treatment and Cathodic Electro-deposition Process Operation
Perform Gray Primer (2nd Primer) Application Procedures	Perform Top Coat Application Procedures	Weld and Braze Automotive Body Shell	Perform Tinsmith Operation	Melt Aluminum-Silicon Alloys for Safety Tested Castings
Melt Metals Using Coreless Induction Furnace	Melt Automotive Gray Iron Castings in Cupola	Prepare Sand Mixture for Heavy Casting	Perform Hand Molding To Produce Heavy Castings	Pour Molten Metal to Heavy Castings
Rectify Faults on Installed Electrical Parts to Engine Assembly	Rectify Faults on Installed Electrical Parts and Electronic Units to Body Interior Compartment	Rectify Faults on Installed Electrical Parts and Electronic Units to Dash Instrument Panel	Rectify Faults on Installed Electrical Parts to Exterior and Engine Compartment	Rectify Faults on Installed Audio and Video System to Automotive Vehicle
Conduct Engine Hot Test	Rectify Assembly Faults on Assembled Mechanical Assemblies	Rectify Faults on Mounted/Installed Brake and Fuel System	Rectify Faults on Mounted/Installed Power Drive System	Rectify Faults on Mounted/Installed Suspension Drive Train
Select Heat Treatment Process	Perform Heat Treatment Process	Change Equipment Dies	Prepare and Start Equipment for Production	Produce Injection Molded Products
Produce Blow Molded Products	Apply quality systems	Conduct product and/or process capability studies	Maintain/supervise the application of quality procedures	Select and classify materials and parts for assembly of wiring harness
Perform cutting and stripping of electrical wires	Perform crimping and soldering of terminals	Perform tying, taping and finishing of assembly wires	Use Comparison and Basic Measuring Devices	Measure Components Using Coordinate Measuring Machines

Use Graphical Techniques and Perform Simple Statistical Computations	Machine Parts	Perform Precision Assembly	Perform press machine setting	Perform mechanical shearing operation
Perform mechanical press forming operation	Perform Hand Forging	Perform Hammer Forging	Perform Basic Incidental Heat/Quenching, Tempering and Annealing	Hand Forge Complex Shapes
Hammer Forge Complex Shapes	Perform Drop and Upset Forging	Carry Out Minor Vehicle Maintenance and Servicing	Drive Light Vehicle	Obey and Observe Traffic Rules and Regulations
Implement and Coordinate Accident-Emergency Procedures	Perform Minor Maintenance and Servicing on Vehicles Classified under LTO Restriction Codes 3 up to 5	Perform Pre-and Post Operation Procedures Vehicles Classified under LTO Restriction Codes 3 up to 5	Drive Passenger Bus	Drive Straight Truck
Perform Minor Maintenance and Servicing on Vehicles Classified under LTO Restriction Codes 6 up to 8	Perform Pre-and Post Operation Procedures Vehicles Classified under LTO Restriction Codes 6 up to 8	Observe Road Health and Safety Practices	Drive Articulated Vehicle	Perform pre-delivery inspection
Perform periodic maintenance of automotive engine	Perform periodic maintenance of drive train	Perform periodic maintenance of brake system	Perform periodic maintenance of suspension system	Perform periodic maintenance of steering system
Service Automotive Battery	Service Ignition System	Test and Repair Wiring/Lighting System	Service Starting System	Service Charging System
Service Engine Mechanical System	Service Clutch System	Service Differential and Front Axle	Service Steering System	Service Brake System
Service Suspension System	Perform Underchassis Preventive Maintenance	Overhaul Manual Transmission	Test and Repair Electrical Security System/Components	Service Electronic Engine Management
Overhaul Engines and Associated Components	Service Automatic Transmission	Perform Maintenance Service Check-Up and Repair to Auto AC System	Remove and Replace Automotive Engine and Engine-Related Systems	Service and repair electronically controlled steering systems
Service and repair electronically controlled suspension systems	Repair Instruments and warning systems	Carry out diagnostic procedures	Service Diesel Engine Management System	Service Electronic Body Management System

Service Diesel Fuel Injection System Components	Service Electronic Drive Management System	Service Emission Control System	Service and repair electronically controlled anti-lock braking system	Service and repair electronically operated traction control System
Service and repair electronically operated stability control System	Plan assessment activities and processes	Manage facility and inventory requirements	Estimate complex jobs	Ensure a safe workplace
Implement continuous improvement	Manage people performance	Plan and manage compliance with environmental regulations in a workplace or business	Service manual air-conditioner system	Diagnose and repair manual air-conditioner system
Repair manual air-conditioner compressor magnetic clutch	Diagnose and repair ignition system	Diagnose and repair starting system	Diagnose and repair charging system	Diagnose and repair body electrical system
Remove and store vehicle body components	Replace and repair vehicle body panels and components	Repair vehicle body panels using filler (rough finish)	Conduct basic inspection of engine and other electrical components	Perform installation of Speed Limitation Device
Maintain Speed Limitation Device	Diagnose and repair drive lines	Diagnose and repair clutch system	Diagnose and overhaul manual transmission/ transaxle	Diagnose and overhaul differential
Diagnose and repair brake system	Diagnose and repair steering system	Diagnose and repair suspension system	Diagnose and repair engine cooling and lubrication system	Diagnose and repair intake and exhaust system
Diagnose and overhaul engine mechanical system				

GLOSSARY OF TERMS

BASIC HAND TOOLS	Are tools that is powered by hand (manual labour) rather than by any other force (ex. Electric, Air, Hydrualics, etc,). Hand tools are generally less dangerous than power tools.
DIAGNOSE	To identify the nature of condition
REPAIR	Replace and adjust manual conditioner compressor magnetic clutch
SPECIAL TOOLS	Are tools used to enable the safe, accurate, and efficient performance of service operations that are difficult or impossible to perform using basic hand tools alone.
TROUBLESHOOTING	Trace and correct faults

TRAINING REGULATIONS (TR)
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