



COMPETENCY BASED CURRICULUM

MECHANICAL FITTING - BQFC3

TECHNICAL TRAINERS TRAINING AND RESOURCE CENTRE
DEPARTMENT OF WORKFORCE PLANNING AND SKILLS DEVELOPMENT
MINISTRY OF EDUCATION AND SKILLS DEVELOPMENT
DEKILING: SAPRANG



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Ministry of Education and Skills Development

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FOREWORD

Bhutan has seen a gradual increase in the requirement of skilled workers in recent years due to growth of industries. However, supply of skilled workforce that are responsive to the needs of the industry has not been able to keep in pace with the industry demand. Since the skilled workers are crucial ingredient for socio-economic development of the country, it is important to have adequate number of trained and certified workers. With growing industries, the “Mechanical Fitters” are not only the most significant occupation but also have high demand in the labour market. In an effort to meet the skilled human resources requirement in the area of power sector, it is imperative to deliver training based on Competency Based Training system in Mechanical Fitting to ensure quality and adequate number of work force in this sector.

To this end, the Department of Workforce Planning and Skills Development (DWPSD) is pleased to present the revised edition of Competency Based Curriculum for Mechanical Fitting BQFC3 course developed based on National Competency Standards (NCS) and using standard curriculum development guidelines. Since it is an outcome of a more participatory process of curriculum development, it is expected to provide training delivery with reformed approaches having its content being directly related to labour market needs, focusing on imparting of skills and assessment based on industry work standards. We believe that the Competency Based Curriculum will help in bridging the skill gap between industry’s needs and training institutes thereby enhance the employability of the technical graduates.

The Department acknowledges the valuable contributions made by institutes, officials, and experts from relevant industries who were involved in the design and development of this curriculum. As it is a dynamic document which may require revision based on the needs of the changing labour market, the Department look forward to receiving valuable feedbacks from the institutes and the industries to further improve and refine the curriculum

The Department hope that this document will help advance Competency Based Learning in most of the TVET Institutions.

Director
Department of Workforce Planning and Skills Development

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The TVET Professional Service Division (TPSD) under the Department of Technical Education (DTE), MoLHR would like to express our appreciation and with particular thanks to the following subject experts and facilitators who have participated in the development of Mechanical Fitting NC-III Curriculum.

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Competency Profile
Occupation: Mechanical Fitter
Level: BQFC3

Competency Area	Sub-Competency Area	Competencies/Tasks →			
A: Maintain hydraulic and pneumatic system	A1: Maintain hydraulic system	A1.01 Diagnose faults of hydraulic system	A1.02 Change hydraulic oil	A1.03 Replace pressure gauge	A1.04 Change hydraulic valves
		A1.05 Replace hydraulic pump	A1.06 Repair vane pump	A1.07 Repair axial piston pump	A1.08 Change hydraulic hose pipe
		A1.09 Change seal kit of linear actuator	A1.10 Replace hydraulic motor		
	A2: Maintain pneumatic system	A2.01 Diagnose faults of pneumatic system	A2.02 Change seal kit of pneumatic cylinder	A2.03 Change pneumatic valves	A2.04 Change air hose pipe
		A2.05 Replace FRL			
	A3: Maintain air compressor	A3.01 Diagnose the faults of air compressor	A3.02 Change compressor oil	A3.03 Replace air filter	A3.04 Replace element separator
		A3.05 Replace moisture separator	A3.06 Replace components of reciprocating air compressor	A3.07 Replace components of screw compressor	A3.08 Service air dryer

B: Install simple machines	B1: Prepare for installation of machine	B1.01 Plan for Installation	B1.02 Prepare the Installation Area	B1.03 Inspect the installation area	
	B2: Install machine	B2.01 Install centrifugal pump	B2.02 Install reciprocating pump	B2.03 Install hydraulic press	
	B3: Perform test run	B3.01 Maintain alignment	B3.02 Maintain RPM	B3.03 Maintain vibration	B3.04 Maintain flow pressure

COURSE INFORMATION

COURSE TITLE LEVEL	Mechanical Fitting Certificate 3
COURSE DESCRIPTION	This course is designed to provide the knowledge, skills and attitudes to become competent as Mechanical Fitter in accordance with industry standards. Upon completion of this course, the graduates will be able to work in government, corporate and private organizations where they can maintain the hydraulic & pneumatic system and install simple machines. To obtain the qualification of Mechanical Fitter BQFC3, all learning outcomes prescribed for this qualification must be achieved.
INSTITUTE TRAINING DURATION	449 Hours
ON-THE-JOB TRAINING(OJT) DURATION	272 Hours
TOTAL DURATION	721 Hours
TRAINING PROPORTION	1:12 (Practical) 1:20 (Theory)
ENTRY REQUIREMENT	● Holder of Mechanical Fitter BQFC2 Certificate
COURSE OBJECTIVE	Upon completion of Mechanical Fitting BQFC3, the trainee will be able to: ● Maintain hydraulic system ● Maintain pneumatic system ● Install simple machine
TRAINER QUALIFICATION	● Must have undergone Training of Trainers-Instructional Methodology (Pedagogy) ● Must be a minimum holder of Diploma in Mechanical with 2-3 years of working experience ● Should have good moral character ● Must have at least 5 years job/industry experience

COURSE STRUCTURE

Training Modality	Module Title	Learning outcomes	Nominal Duration
Institute Training	A. Maintaining hydraulic and pneumatic system	A1. Maintain hydraulic system A2. Maintain pneumatic system A3. Maintain air compressor	354 Hours
	B. Installing simple machines	B1. Prepare for installation of machine B2. Install machine B3. Perform test run	95 Hours
Total duration (Institute Training)			449 Hours
On the Job Training	A. Maintaining hydraulic and pneumatic system	A1. Maintain hydraulic system A2. Maintain pneumatic system A3. Maintain air compressor	136 Hours
	B. Installing simple machines	B1. Prepare for installation of machine B2. Install machine B3. Perform test run	136 Hours
Total duration (On the Job Training)			272 Hours

ASSESSMENT Internal assessment for every module and learning outcome will be done through assignments, project works, continuous assessment, demonstration of practical skills/observations, oral questioning and written test. The trainees will be either *Competent with distinction*; *Competent with Merit*; *Competent* or *Not Yet Competent* based on their fulfilment of the Grading criteria:

Grade	Definition	Percentage
CD	Competent with Distinction	80-100
CM	Competent with Merit	70-79.99
CY	Competent	60-69.99
CN	Not Yet Competent	Below 60

Summative assessment after completion of each Bhutan Qualification Framework Certificate will be conducted by Bhutan Qualifications and Qualification and Professionals Certification Authority as per the National Competency Standards and Regulations for National Assessment and Certification System (*refer annex 1: assessment sample resources*), provided the course is accredited with BQPCA, MoESD.

CERTIFICATION On the successful completion of every module, the Institute will award a Certificate of achievement to the trainees (*refer annex II*). The Bhutan Qualifications and Professionals Certification Authority will award a BQF Certificate to the trainees upon the successful completion of each BQFC level.

COURSE DELIVERY

1. Modular
2. Demonstration
3. Lecture
4. Discussion
5. Project Work

RESOURCES

Tools:

- Screw driver set, spanner set, adjustable wrench, hacksaw, funnel, Allen key, pipe wrench, bearing puller, punch set, 'O' ring remover, wooden mallet, combination plier, soft brush, piston ring clamp, torque wrench, circlip plier set, socket set, oil can, grease gun, crowbar, rammer and claw hammer

Instrument:

- Vernier caliper set, pressure gauge, pyrometer, tachometer, dial gauge, laser alignment, feeler gauge, spirit level, try square, measuring tape, multimeter, vibration meter and plumb bob

Equipment:

- Hydraulic power pack, hydraulic vane pump, axial piston pump, hydraulic actuator, eye bolt, d-shackle, sling, pneumatic linear actuator, pneumatic/air motor, Filter Regulator Lubricator (FRL), air compressor and its accessories, blower, air dryer, centrifugal pump, motor, chain pulley, lifting crane, fork lift, hand pallet, reciprocating pump and hydraulic press

Materials:

- Hydraulic oil, anti-rust spray, thread seal, hydraulic valve, kerosene, emery paper, RTV solution, jar, tray, hydraulic hose pipe, cleaning agent, hydraulic cap, oil seal, wooden blocks, markin cloth, soap solution, leak detector spray, seal kit, pneumatic valves, pneumatic hose pipe, spare parts, air filter, lubricant, checklist, pen, notebook, manual, oil, flushing oil, filter element, gasket, element separator, moisture separator, components of compressor, mason thread, pegs, aggregate, sand, cement, water, planks, nail, foundation bolts and nuts, washer, spacer, nuts and bolts, vibration damper, jubilee clamp, gland packing seals, grease, coupling, anti-seize spray and feather key

PPE:

- Safety goggles, face mask, safety boot, workshop dress, apron, hand gloves, safety helmet, ear muff and ear plug

Learning Material:

- Text books
- Audio Visuals
- Reference books
- Handouts
- Competency-Based Learning Materials (CBLM)

Infrastructure and training facilities:

- ***Theory classroom size:*** Minimum of 1.5 square meter per person
- ***Practical workshop size:*** Minimum of 6.25 m² per student. Variable must be considered dependent upon type of skills being taught and the number of students being participated at one time.

MODULE INFORMATION

MECHANICAL FITTING BQFC3

MODULE 1: MAINTAINING HYDRAULIC AND PNEUMATIC SYSTEM

MODULE INFORMATION

Occupation	Mechanical Fitter
Competency Area	Maintain hydraulic and pneumatic system
Module Title	Maintaining hydraulic and pneumatic system
Module Code	7233-L3-M1
Module Description	This module is structured to provide the learners with the knowledge, skills and right attitude required to maintain the hydraulic system, pneumatic system, and air compressor
Nominal Duration	354 Hours
Certificate Level	BQFC3
Pre-requisite	Certificate holder of Mechanical Fitter BQFC2
Learning Outcome	1. Maintain hydraulic system 2. Maintain pneumatic system 3. Maintain air compressor

Module Title	Maintaining hydraulic and pneumatic system		
Module Code	7233- L3-M1		
Learning Outcome 1	Maintain hydraulic system		
Duration	Theory: 40 hours	Practical:164 hours	Total: 204 hours
Assessment Criteria	• Faults of hydraulic system are checked as per the standard procedures • Hydraulic oil is refilled as per the Original Equipment Manufacturers (OEM) manual following standard procedures • Pressure gauge is replaced as per the standard procedures • Hydraulic valve is changed as per the Operational and Maintenance (O&M) Manual following standard procedures • Hydraulic pump is replaced as per O&M manual following standard procedures • Vane pump is repaired as per O&M manual following standard procedures • Axial piston pump is repaired as per the O&M manual following standard procedures • Hydraulic hose pipe is changed as per the O&M manual following standard procedures • Oil seal is replaced as per the O&M manual following standard procedures. • Hydraulic motor is replaced as per the O&M manual following standard procedures		
Content	A1.01 Diagnosing faults of hydraulic system Knowledge • Definition of hydraulic system • Basic working principle of hydraulic system • Hydraulic symbols • Fundamental concept of fluid • Definition of cavitation • Purpose of removing air trapped (cavitation) from the system • Circuit diagram of hydraulic system • Basic component of the hydraulic system and its functions • Characteristics of hydraulic hose pipe • Pascal's law • Components of hydraulic power pack • Problems in hydraulic system and its causes and remedies • Basic of first aids Skills • Communication skills • Interpreting drawing		

	<i>Attitudes, safety and environment concerns</i> • Working in team • Effective time management • Having integrity and work ethics • Proper handling and storage of tools and equipment • Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste • Ensuring correct diagnosis of the hydraulic system A1.02 Changing hydraulic oil <i>Knowledge</i> • Purpose of changing hydraulic oil • Types of hydraulic oil • Specification of hydraulic oil • Properties of hydraulic oil <i>Skills</i> • Communication skills • Interpreting O&M manual • Time management • Team work • Interpersonal relationships <i>Attitudes, safety and environment concerns</i> • Working in team • Effective time management • Having integrity and work ethics • Efficient use of materials • Proper handling and storage of tools, materials and equipment • Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste • Ensuring to refill the hydraulic oil to specified level • Ensuring correct selection of hydraulic oil grade A1.03 Replacing pressure gauge <i>Knowledge</i> • Purpose of pressure gauge • Working principle of pressure gauge • Types of pressure gauge • Unit of pressure • Purpose of thread seal • Importance of calibration <i>Skills</i> • Communication skills • Reading pressure gauge
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	• Applying thread seal • Time management • Team work • Interpersonal relationships <i>Attitudes, safety and environment concerns</i> • Having work ethics and integrity • Proper handling and storage of pressure gauge and tools • Effective time management • Efficient use of materials • Ensuring correct use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulations • Ensuring to release the pressure prior to removal of pressure gauge • Ensuring proper fitting of pressure gauge A1.04 Changing hydraulic valve <i>Knowledge</i> • Definition of hydraulic valve • Components of the hydraulic valve • Working principles of hydraulic valves • Types of hydraulic valves • Symbol of hydraulic valves • Causes of hydraulic valve failure • Importance of changing hydraulic valve • Interpreting circuit diagram of hydraulic system <i>Skills</i> • Interpreting circuit diagram • Interpreting O&M manual • Time management • Team work • Interpersonal relationships <i>Attitudes, safety and environment concerns</i> • Working in team • Being patient • Effective time management • Having integrity and work ethics • Efficient use of materials • Proper handling and storage of tools, materials and equipment • Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste • Ensuring proper fitting of valve with hose pipe
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	A1.05 Replacing hydraulic pump Knowledge ● Definition of hydraulic pump ● Function of hydraulic pump ● Types of hydraulic pump ● Components of hydraulic pump ● Working principle of hydraulic pump ● Causes of hydraulic pump failure ● Importance of 3R (Reduce, Reuse and Recycle) Skills ● Interpreting drawing ● Using vernier calliper ● Time management ● Team work ● Interpersonal relationships Attitudes, safety and environment concerns ● Working in team ● Being patient ● Effective time management ● Having integrity and work ethics ● Efficient use of materials ● Proper handling and storage of tools, materials and equipment ● Ensuring correct use of PPE ● Ensuring to follow OHS rules and regulations ● Ensuring proper disposal of waste ● Ensuring proper fixing of oil seal A1.06 Repairing vane pump Knowledge ● Definition of hydraulic vane pump ● Function of hydraulic vane pump ● Parts of hydraulic vane pump ● Specification of vane pump ● Working principle of hydraulic vane pump ● Causes of hydraulic vane pump failure Skills ● Applying thread seal ● Interpreting drawing ● Using pulley puller ● Time management ● Team work ● Interpersonal relationships
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	<i>Attitudes, safety and environment concerns</i> ● Working in team ● Being patient ● Effective time management ● Having integrity and work ethics ● Efficient use of materials ● Proper handling and storage of tools and materials ● Ensuring correct use of PPE ● Ensuring to follow OHS rules and regulations ● Ensuring proper disposal of waste ● Ensuring proper fixing of the gasket or sealant A1.07 Repairing axial piston pump <i>Knowledge</i> ● Definition of axial piston pump ● Function of axial piston pump ● Types of axial piston pump ● Specification of piston pump ● Parts of axial piston pump ● Working principle of axial piston pump ● Causes of axial piston pump failure <i>Skills</i> ● Applying thread seal ● Interpreting drawing ● Using pulley puller ● Time management ● Team work ● Interpersonal relationships <i>Attitudes, safety and environment concerns</i> ● Working in team ● Being patient ● Effective time management ● Having Integrity and work ethics ● Efficient use of materials ● Proper handling and storage of tools and materials ● Ensuring correct use of PPE ● Ensuring to follow OHS rules and regulations ● Ensuring proper disposal of waste ● Ensuring proper fixing of gasket or sealant
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	A1.08 Changing hydraulic hose pipe Knowledge • Definition of hydraulic hose pipe • Purpose of hose pipe • Types of hydraulic hose pipe • Components of hose pipe • Specification of hydraulic hose pipe Skills • Using hydraulic power pack • Communication skill • Applying thread seal • Time management • Team work • Interpersonal relationships Attitudes, safety and environment concerns • Working in team • Being patient • Effective time management • Having integrity and work ethics • Efficient use of materials • Proper handling and storage of tools, materials and equipment • Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste • Ensuring no trapping of air in the hose pipe when fitting A1.09 Changing seal kit of linear actuator Knowledge • Function of hydraulic linear actuator • Types of hydraulic linear actuator • Types of seal kit • Function of seal kit • Causes of seal kit failure • Importance of changing seal kit Skills • Applying thread seal • Communication skills • Using 'O' ring remover • Time management • Team work • Interpersonal relationships
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	<i>Attitudes, safety and environment concerns</i> • Working in team • Being patient • Effective time management • Having integrity and work ethics • Efficient use of materials • Proper handling and storage of tools, materials and equipment • Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste A1.10 Replacing hydraulic motor <i>Knowledge</i> • Functions of hydraulic motor • Types of hydraulic motor • Components of hydraulic motor • Working principle of hydraulic motor • Difference between linear and rotary actuator (hydraulic motor) • Advantages and disadvantages of linear and rotary actuator (hydraulic motor) • Application of hydraulic motor • Causes of hydraulic motor failure • Importance of replacing hydraulic motor <i>Skills</i> • Communication skills • Lifting skills • Time management • Team work • Interpersonal relationships <i>Attitudes, safety and environment concerns</i> • Effective time management • Having integrity and work ethics • Efficient use of materials • Proper handling and storage of tools, materials and equipment • Working in team • Ensuring to follow OHS rules and regulation • Ensuring correct use of PPE • Ensuring proper disposal of waste
Learning Conditions	Learning Materials • CBLM • Handouts • Audio Visuals

	• Textbooks • Reference books • O&M Manuals Learning facilities and infrastructure • Classroom with adequate facilities • Information Technology (IT) lab • Library • Workshop Tools • Screw driver set, spanner set, adjustable wrench, funnel, Allen key, pipe wrench, pulley puller, punch, ‘O’ ring pick-stick, wooden mallet, torque wrench, and pliers Instrument • Vernier caliper Equipment • Hydraulic power pack, pressure gauge, hydraulic pump, lifting equipment, hydraulic actuator, chain block, eye bolt, D-shackle, and sling Materials • Hydraulic oil, anti-rust spray, thread seal, hydraulic valve kerosene, emery paper, spare parts, RTV solution, jar, tray, hydraulic hose pipe, cleaning agent, hydraulic cap, oil seal, wooden blocks and markin cloth PPE • Safety goggles, dust mask, safety boot, workshop dress, apron, hand gloves and safety helmet
Instructional Methodologies	• Lectures • Demonstration • Interactive discussions • Role plays • Guided practice • Group activities • Individual practices
Method of Assessment	• Practical observation • Oral questioning /viva-voce • Written test • Assignment

Module Title	Maintaining hydraulic and pneumatic system		
Module Code	7233- L3-M1		
Learning Outcome 2	Maintain pneumatic system		
Duration	Theory: 9 hours	Practical: 33 hours	Total: 42 hours
Assessment Criteria	- Faults of pneumatic system are diagnosed as per the circuit diagram following standard procedures - Seal kit is changed as per the O&M manual following standard procedures - Pneumatic valve is changed as per the O&M manual following standard procedures - Pneumatic hose pipe is changed as per the O&M manual following standard procedures - FRL is maintained as per the O&M manual following standard procedures		
Content	A2.01 Diagnosing faults of pneumatic system Knowledge - Definition of pneumatic - Working principle of pneumatic system - Advantages and limitations of pneumatic system - Pneumatic symbols - Methods of checking leakage - Problems in pneumatic system and its causes and remedies - Difference between hydraulic and pneumatic system Skills - Interpreting circuit diagram - Reading pressure gauge - Communication skills - Decision making - Observation skills - Time management - Team work - Interpersonal relationships Attitudes, safety and environment concerns - Working in team - Being patient - Effective time management - Having integrity and work ethics - Efficient use of materials - Proper handling and storage of tools, instruments, materials and equipment - Ensuring correct use of PPE - Ensuring to follow OHS rules and regulations - Ensuring proper disposal of waste		

	A2.02 Changing seal kit of pneumatic cylinder Knowledge • Types of pneumatic actuator • Definition of seal kit • Function of seal kit • Types of seal kit • Causes of seal kit failure Skills • Using vernier caliper • Communication skills • Observation skills • Problem solving skills • Time management • Team work • Interpersonal relationships Attitudes, safety and environment concerns • Working in team • Being patient • Effective time management • Having integrity and work ethics • Efficient use of materials • Proper handling and storage of tools, materials and equipment • Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste • Ensuring proper fixing of seal kit A2.03 Changing pneumatic valves Knowledge • Definition of pneumatic valve • Types of pneumatic valve • Component of pneumatic valves • Working principle of pneumatic valves • Symbols of pneumatic valves • Difference between hydraulic and pneumatic valve • Causes of pneumatic valve failure • Importance of changing the pneumatic valve Skills • Communication skills • Applying thread seal • Observation skills • Problem solving skills • Time management • Team work
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	• Interpersonal relationships <i>Attitudes, safety and environment concerns</i> • Working in team • Effective time management • Having integrity and work ethics • Proper handling and storage of tools, materials and equipment • Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste • Ensuring proper fixing of pneumatic valve A2.04 Changing air hose pipe <i>Knowledge</i> • Definition of pneumatic hose pipe • Purpose of hose pipes • Types of pneumatic hose pipe • Specification of pneumatic hose pipe • Types of PU fittings and its purpose <i>Skills</i> • Applying thread seal • Communication skill • PU fitting skills • Observation skills • Time management • Team work • Interpersonal relationships <i>Attitudes, safety and environment concerns</i> • Working in team • Being patient • Effective time management • Having integrity and work ethics • Efficient use of materials • Proper handling and storage of tools, materials and equipment • Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste A2.05 Replacing Filter Regulator Lubricator (FRL) <i>Knowledge</i> • Definition of filter, regulator and lubricator • Function of filter, regulator and lubricator
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	• Types of filter, regulator and lubricator • Application of filter, regulator and lubricator • Working principle of filter, regulator and lubricator • Purpose of removing moisture from the filter • Causes of filter, regulator and lubricator failure • Importance of maintaining filter, regulator and lubricator Skills • Using pressure gauge • Communication skills • Observation skills • Time management • Team work • Interpersonal relationships Attitudes, safety and environment concerns • Having integrity and work ethics • Proper handling and storage of tools, materials and equipment • Effective time management • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulations • Ensuring proper fitting of filter housing
Learning Conditions	Learning Materials • CBLM • Handouts • Audio Visuals • Textbooks • Reference books • O&M Manual Learning facilities and infrastructure • Classroom with adequate facilities • Industries • Workshop Tools • Hammer, mallet, screw driver, spanner set, Allen key set, pipe wrench, plier, adjustable wrench and torque wrench Instrument • Pressure gauge, pyrometer and tachometer Equipment

	● Pneumatic actuator, air compressor, reservoir tank, moisture separator, air dryer and FRL Materials ● Markin cloth, RTV solution, leak detector spray, seal kit, pneumatic valves, thread seal, pneumatic hose pipe, spare parts, kerosene, paint marker, new air filter and lubricant PPE ● Safety goggles, face mask, safety boot, workshop dress, apron, hand gloves, safety helmet , earplug
Instructional Methodologies	● Lectures ● Demonstration ● Interactive discussions ● Role plays ● Guided practice ● Group activities ● Individual practices
Method of Assessment	● Practical observation ● Oral questioning /viva-voce ● Written test ● Assignment

Module Title	Maintaining hydraulic and pneumatic system		
Module Code	7233- L3-M1		
Learning Outcome 3	Maintain air compressor		
Duration	Theory:22 hours	Practical: 86 hours	Total: 108 hours
Assessment Criteria	- Faults of compressor are diagnosed as per the OEM manual following standard procedures - Compressor oil is changed as per O&M manual following the standard procedures - Air filter is replaced as per the O&M manual following standard practices - Element separator is replaced as per the O&M manual following standard procedures - Moisture separator is replaced as per the O&M manual following standard procedures - Components of reciprocating air compressor are replaced as per the O&M manual following standard procedures - Components of screw compressor are replaced as per the O&M manual following standard procedures - Air dryer is serviced as per the O&M manual following standard procedures		
Content	A3.01 Diagnosing the faults of air compressor Knowledge - Definition of air compressor - Function of air compressor - Types of air compressor - Components of air compressor - Working principle of air compressor - Maintenance schedule of air compressor - Problems in air compressor and its causes and remedies Skills - Interpreting drawing - Interpreting O&M manuals - Communication skills - Observation skills - Problem solving skills - Time management - Team work - Interpersonal relationships Attitudes, safety and environment concerns - Working in team - Being patient - Effective time management - Having integrity and work ethics		

	● Efficient use of materials ● Proper handling and storage of tools, materials and equipment ● Ensuring to follow OHS rules and regulations ● Ensuring correct use of PPE ● Ensuring correct diagnosis of faults A3.02 Changing compressor oil Knowledge ● Function of compressor oil ● Types of compressor oil ● Specification of compressor oil ● Importance of using oil filter ● Interval of changing compressor oil Skills ● Interpreting O&M manuals ● Communication skills ● Observation skills ● Problem solving skills ● Time management ● Team work ● Interpersonal relationships Attitudes, safety and environment concerns ● Effective time management ● Having integrity and work ethics ● Efficient use of materials ● Proper handling and storage of tools and spares parts ● Ensuring correct use of PPE ● Ensuring to follow OHS rules and regulations ● Ensuring proper disposal of waste ● Ensuring proper fixing of drain plug ● Ensuring to fill the oil to the specified level A3.03 Replacing air filter Knowledge ● Function of air filter ● Types of air filter ● Specifications of air filter ● Problems in air filter, its causes and remedial actions Skills ● Communication skills ● Using blower ● Using air compressor
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	• Observation skills • Fitting skills • Time management • Team work • Interpersonal relationships <i>Attitudes, safety and environment concerns</i> • Effective time management • Having integrity and work ethics • Efficient use of materials • Proper handling and storage of tools and spares parts • Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring to blow off dust in proper area • Ensuring to avoid excessive usage of air pressure while cleaning the air filter A3.04 Replacing element separator <i>Knowledge</i> • Definition of element separator • Types of element separator • Function of element separator • Causes and effects of damaged element separator <i>Skills</i> • Communication skills • Using scraper • Observation skills • Time management • Team work • Interpersonal relationships <i>Attitudes, safety and environment concerns</i> • Effective time management • Having integrity and work ethics • Efficient use of materials • Proper handling of tools and spares parts • Ensuring appropriate use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste • Ensuring to keep the floor free of oil A3.05 Replacing moisture separator <i>Knowledge</i> • Function of moisture separator • Working principle of moisture separator
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	● Causes and effects of damaged moisture separator Skills ● Communication skills ● Applying thread seal ● Observation skills ● Time management ● Team work ● Interpersonal relationships Attitudes, safety and environment concerns ● Effective time management ● Having integrity and work ethics ● Efficient use of materials ● Proper handling and storage of tools and spares parts ● Ensuring correct use of PPE ● Ensuring to follow safety rules and regulations of OHS ● Ensuring proper disposal of waste ● Ensuring to close the gate valve prior to work execution ● Ensuring proper fitting of pipelines A3.06 Replacing components of reciprocating air compressor Knowledge ● Definition of reciprocating air compressor ● Working principle of reciprocating air compressor ● Application of reciprocating compressor ● Components of reciprocating air compressor Skills ● Using torque wrench ● Interpreting drawing ● Interpreting O&M manual ● Using piston ring clamp ● Communication skills ● Observation skills ● Time management ● Team work ● Interpersonal relationships Attitudes, safety and environment concerns ● Working in team ● Being patient ● Effective time management ● Having integrity and work ethics ● Efficient use of materials ● Proper handling and storage of tools, materials and equipment
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	• Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste A3.07 Replacing components of screw compressor Knowledge • Definition of screw compressor • Function of screw compressor • Components of the screw compressor • Working principles of screw compressor • Causes of compressor failure Skills • Interpreting drawing • Using circlip pliers • Using feeler gauge • Using dial gauge • Using laser alignment • Using chain block • Using eye bolt • Using D-shackle • Using sling • Communication skills • Observation skills Attitudes, safety and environment concerns • Working in team • Being patient • Effective time management • Having integrity and work ethics • Efficient use of materials • Proper handling and storage of tools, materials and equipment • Ensuring correct use of PPE • Ensuring to follow OHS rules and regulations • Ensuring proper disposal of waste A3.08 Servicing air dryer Knowledge • Working principle of air dryer • Components of air dryer and its function • Definition of refrigerant • Types of refrigerant • Function of refrigerant • Causes and remedial actions of air dryer failure • Importance of setting moisture drain out timing
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	Skills ● Interpreting drawing ● Interpreting O&M manual ● Communication skills ● Using compressor ● Observation skills ● Time management ● Team work ● Interpersonal relationships Attitudes, safety and environment concerns ● Working in team ● Being patient ● Effective time management ● Having integrity and work ethics ● Efficient use of materials ● Proper handling and storage of tools, materials and equipment ● Ensuring correct use of PPE ● Ensuring to follow OHS rules and regulations ● Ensuring proper disposal of waste
Learning Conditions	Learning Materials ● CBLM ● Handouts ● Audio Visuals ● Textbooks ● Reference books ● O&M Manual Learning facilities and infrastructure ● Classroom with adequate facilities ● Industries ● Workshop Tools ● Adjustable wrench, screwdriver set, spanner set, soft brush, allen key set, piston ring clamp, plier, torque wrench, mallet, hammer, pulley puller, circlip pliers and socket set Instrument ● Pressure gauge, pyrometer, tachometer, dial gauge, laser alignment and feeler gauge Equipment ● Air compressor, blower, chain block, eye bolt, belt, D-

	shackle, sling and air dryer Materials ● Checklist, pen, notebook, oil, filter element, gasket, RTV solution, element separator, moisture separator, thread seal, components of compressor, anti-rust, kerosene, markin cloth and tray PPE ● Hand gloves, face mask, safety shoe, safety goggles, apron, workshop dress, safety helmet and ear muff
Instructional Methodologies	● Lectures ● Demonstration ● Interactive discussions ● Role plays ● Guided practice ● Group activities ● Individual practices
Method of Assessment	● Practical observation ● Oral questioning/viva-voce ● Written test ● Assignment

MODULE 2: INSTALLING SIMPLE MACHINES

MODULE INFORMATION

Occupation	Mechanical Fitter
Competency Area	Install simple machines
Module Title	Preparing for installation of machines
Module Code	7233- L3-M2
Module Description	This module is structured to provide the learners with the knowledge, skills and right attitude required to plan for machine installation, prepare for machine installation and inspect installed machine.
Nominal Duration	95 hours
Certificate Level	BQF Certificate 3
Pre-requisite	Completed Module: 7233- L3-M1
Learning Outcome	1. Plan for installation 2. Prepare the installation area 3. Inspect the installation area

Module Title	Installing simple machines		
Module Code	7233- L3-M2		
Learning Outcome 1	Prepare for installation of machine		
Duration	Theory:4 hours	Practical: 13 hours	Total:17 hours
Assessment Criteria	- Plan for installation as per the drawing following standard procedures. - Prepare the installation area as per OEM manual following standard procedures. - Inspect the installation area as per the standard procedures.		
Content	B1.01 Planning for installation Knowledge - Introduction to simple machines - Differences between simple machine and complex machine. Skills - Interpreting O&M manual - Planning skills - Decision making skills - Communication skills - Time management - Team work - Interpersonal relationships Attitudes, safety and environment concern - Having work ethics and integrity - Being efficient in using materials - Proper handling and storage of tools and materials - Having patience - Effective time management B1.02 Preparing the installation area Knowledge - Importance of foundation Skills - Interpreting O&M manual - Fitting skills - Observation skills - Communication skills - Time management - Team work - Interpersonal relationships		

	<i>Attitudes, safety and environment concerns</i> ● Being time conscious ● Having work ethics and integrity ● Being efficient in using materials ● Proper handling and storage of tools and materials ● Having patience ● Ensuring to follow OHS rules and regulation B1.03 Inspecting installation area <i>Knowledge</i> ● Importance of inspection <i>Skills</i> ● Interpreting O&M manual ● Observation skills ● Using spirit level ● Communication skills ● Time management ● Team work ● Interpersonal relationships <i>Attitudes, safety and environment concerns</i> ● Being time conscious ● Having work ethics ● Being efficient in using materials ● Proper handling and storage of tools and materials ● Having patience ● Ensuring proper disposal of wastes ● Ensuring to follow OHS rules and regulation
Learning Conditions	Learning Materials ● CBLM ● Handouts ● Audio Visuals ● Textbooks ● Reference books ● O&M manual Learning facilities and infrastructure ● Classroom with adequate facilities ● Information Technology (IT) lab ● Library ● Industry

	• Workshop Tools • spanner set, screw driver, adjustable wrench, hammer, plier, Instrument • Spirit level, bottle level, try square and measuring tape Equipment • Chain pulley, lifting crane, reciprocating pump and motor Materials • Mason thread, pegs, aggregate, sand, cement, water, planks, nail, foundation bolts and nuts, washer, spacer, nuts and bolts, vibration damper, hose pipe, jubilee clamp and markin cloth PPE • Goggles, nose mask, safety boot, workshop dress, hand gloves, safety helmet and ear muff
Instructional Methodologies	• Lectures • Demonstration • Interactive discussions • Role plays • Guided practice • Group activities • Individual practices
Method of Assessment	• Practical observation • Oral questioning/viva-voce • Written test • Assignment

Module Title	Installing simple machines		
Module Code	7233- L3-M2		
Learning Outcome 2	Install machines		
Duration	Theory: 9 hours	Practical: 33 hours	Total:42 hours
Assessment Criteria	- Centrifugal pump is installed by following the standard procedures - Reciprocating pump is installed by following the standard procedures - Hydraulic press is installed by following standard procedures.		
Content	B2.01 Installing centrifugal pump Knowledge - Definition of Centrifugal pump - Centrifugal pump Components and it's functions - Working principle of centrifugal pump - Types of centrifugal pump - Applications of centrifugal pump - Advantages and disadvantages of centrifugal pump Skills - Using spirit level - Using multimeter - Fitting skills - Observation skills - Communication skills - Problem solving skills Attitudes, safety and environment concern - Working in team - Being patient while installing motor - Effective time management - Having integrity and work ethics - Efficient use of materials - Ensuring correct use of PPE - Ensuring to follow OHS rules and regulations - Ensuring proper disposal of waste - Ensuring proper fitting of coupling		

B2.02 Installing reciprocating pump***Knowledge***

- Definition of reciprocating pump
- Reciprocating pump components and its functions
- Working principle of reciprocating pump
- Types of reciprocating pump
- Applications of reciprocating pump
- Advantages and disadvantages of reciprocating pump
- Differences between centrifugal pump and reciprocating pump

Skills

- Using spirit level
- Using multimeter
- Fitting skills
- Observation skills
- Communication skills
- Problem solving skills

Attitudes, safety and environment concerns

- Working in team
- Effective time management
- Having work ethics and integrity
- Being efficient in using materials
- Proper handling and storage of tools and materials
- Having patience
- Ensuring to follow OHS rules and regulations
- Ensuring proper disposal of wastes

B2.03 Installing hydraulic press***Knowledge***

- Definition of hydraulic press
- Hydraulic press components and its function
- Working principle of hydraulic press
- Application of hydraulic press
- Advantages and disadvantages of hydraulic press

Skills

- Using multimeter
- Fitting skills
- Observation skills
- Communication skills
- Problem solving skills

	<i>Attitudes, safety and environment concerns</i> ● Working in team ● Effective time management ● Having work ethics and integrity ● Being efficient in using materials ● Proper handling and storage of tools and materials ● Having patience ● Ensuring to follow OHS rules and regulations ● Ensuring proper disposal of wastes
Learning Conditions	Learning Materials ● CBLM ● Handouts ● Audio Visuals ● Textbooks ● Reference books ● O&M manual Learning facilities and infrastructure ● Classroom with adequate facilities ● Information Technology (IT) lab ● Library ● Industry ● Workshop Tools ● Spanner set, adjustable wrench, pulley puller, hammer, screw driver, pipe wrench, socket set, lever, Allen key and wooden mallet Instrument ● Spirit level, measuring tape, dial gauge and laser alignment Equipment ● Centrifugal pump, reciprocating pump, hydraulic press and its accessories, control panel, power pack, motor, lifting crane, and chain block Materials ● Hydraulic oil, shims, marking thread, gland packing seals, lubricant, markin cloth, coupling, hosepipe, suction pipe, discharge pipe, gasket and fastener. PPE ● Safety boot, safety goggles, workshop dress, hand gloves, safety helmet, ear muff and nose mask

Instructional Methodologies	• Lectures • Demonstration • Interactive discussions • Role plays • Guided practice • Group activities • Individual practices
Method of Assessment	• Practical observation • Oral questioning/viva-voce • Written test • Assignment

Module Title	Installing simple machines		
Module Code	7233- L3-M2		
Learning Outcome 3	Perform test run		
Duration	Theory: 8 hours	Practical: 28 hours	Total: 36 hours
Assessment Criteria	• Alignment of machine is maintained by following the standard procedures • RPM is maintained by following the standard procedures • Vibration of machine is maintained by following the standard procedures • Flow pressure is maintained by following the standard procedures.		
Content	B3.01 Maintaining alignment Knowledge • Importance of alignment • Causes of misalignment • Types of instruments to check the alignment Skills • Interpreting O&M manual • Using dial indicator • Using laser alignment tools • Fitting skills • Observation skills • Communication skills • Problem solving skills		

	<i>Attitudes, safety and environment concerns</i> ● Working in team ● Effective time management ● Having work ethics and integrity ● Being efficient in using materials ● Proper handling and storage of tools and materials ● Having patience ● Ensuring to follow OHS rules and regulations ● Ensuring proper disposal of wastes B3.02 Maintaining Revolution Per Minute (RPM) <i>Knowledge</i> ● Definition of revolution per minute (RPM) ● Types of RPM measuring instrument ● Importance of checking RPM ● Purpose of reflective tape <i>Skills</i> ● Interpreting O&M manual ● Using tachometer ● Fitting skills ● Observation skills ● Communication skills ● Problem solving skills <i>Attitudes, safety and environment concern</i> ● Working in team ● Effective time management ● Having work ethics and integrity ● Being efficient in using materials ● Proper handling and storage of tools and materials ● Having patience ● Ensuring to follow OHS rules and regulations ● Ensuring proper disposal of wastes B3.03 Maintaining vibration <i>Knowledge</i> ● Definition of vibration and its unit ● Causes and remedial actions of vibration ● Effects of vibration <i>Skills</i> ● Interpreting O&M manual ● Using vibration analyser
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	● Fitting skills ● Observation skills ● Communication skills ● Problem solving skills <i>Attitudes, safety and environment concerns</i> ● Working in team ● Effective time management ● Having work ethics and integrity ● Being efficient in using materials ● Proper handling and storage of tools and materials ● Ensuring to follow OHS rules and regulations ● Ensuring proper disposal of wastes ● Having patience B3.04 Maintaining flow pressure <i>Knowledge</i> ● Definition of pressure ● Definition of pressure gauge ● Types of pressure gauge <i>Skills</i> ● Using pressure gauge ● Interpreting O&M manual ● Fitting skills ● Observation skills ● Communication skills ● Problem solving skills <i>Attitudes, safety and environment concern</i> ● Working in team ● Effective time management ● Having work ethics and integrity ● Being efficient in using materials ● Proper handling and storage of tools and materials ● Ensuring to follow OHS rules and regulations ● Ensuring proper disposal of wastes ● Having patience
Learning Conditions	Learning Materials ● CBLM ● Handouts ● Audio Visuals ● Textbooks

	● Reference books ● O&M manual Learning facilities and infrastructure ● Classroom with adequate facilities ● Information Technology (IT) lab ● Library ● Industry ● Workshop Tools ● Spanner set, screw driver, adjustable wrench, hammer, socket set, wooden mallet and lever Instrument ● Vibration analyser, spirit level, measuring tap, plumb bob, try square and surface gauge. Equipment ● Machine, lifting tools Materials ● Fastener, markin cloth, pulley, feather key, lubricant, reflective tape, Teflon tape and mason thread PPE ● Safety goggles, nose mask, safety boot, workshop dress, hand gloves, ear muff and safety helmet
Instructional Methodologies	● Lectures ● Demonstration ● Interactive discussions ● Role plays ● Guided practice ● Individual practices ● Group activities
Method of Assessment	● Practical observation ● Oral questioning/viva-voce ● Written test ● Assignment

ON THE JOB TRAINING

Module title	Learning outcomes	Tasks	Duration
Maintain hydraulic and pneumatic system	Maintain hydraulic system	Diagnose faults of hydraulic system	136 Hours
		Change hydraulic oil	
		Replace pressure gauge	
		Change hydraulic valves	
		Replace hydraulic pump	
		Repair vane pump	
		Repair axial piston pump	
		Change hydraulic hose pipe	
		Change seal kit of linear actuator	
		Replace hydraulic motor	
	Maintain pneumatic system	Diagnose faults of pneumatic system	
		Change seal kit of pneumatic cylinder	
		Change pneumatic valves	
		Change air hose pipe	
		Replace FRL	
	Maintain air compressor	Diagnose the faults of air compressor	
		Change compressor oil	
		Replace air filter	
		Replace element separator	
		Replace moister separator	
		Replace reciprocating air compressor components	
		Replace components of screw compressor	
		Service air dryer	
Install simple machines	Prepare for installation of machine	Plan for installation	136 Hours
		Prepare for installation area	
		Inspect the installation area	
	Install the machine	Install centrifugal pump	
		Install reciprocating pump	
		Install hydraulic press	
	Perform test run	Maintain alignment	
		Maintain RPM	
		Maintain vibration	
		Maintain flow pressure	
Total OJT duration			272 Hours

What is Competency-Based Curriculum (CBC)

- ✓ A competency-based curriculum is a framework or guide for the subsequent detailed development of competencies, associated methodologies, training and assessment resources.
- ✓ The CBC specifies the outcomes which are consistent with the requirements of the workplace as agreed through the industry or community consultations.
- ✓ CBC can be developed immediately when competency standards exist.
- ✓ When competency standards do not exist, curriculum developers need to clearly define the learning outcomes to be attained. The standard of performance required must be appropriate to industry and occupational needs through the industry/enterprise or specified client group consultations.

The CBC materials are available in both printed and electronic copies.

For more information please contact:

TVET Professional Services Division
Department of Technical Education
Ministry of Labour and Human Resources
WEB Address: www.molhr.gov.bt
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ANNEXES

Annex I: Assessment Sample

Unit of competency	Drive Light Vehicle
Unit Code	8322-U4-L2
Module Title	Driving Light Vehicle
Module Code	8322-U4-L2-M1
Time Duration	45 min *
Problem or Project: Drive Light Vehicle	
Introduction: Perform pre-operating procedures before starting the vehicle. Drive light vehicle under different environment conditions following standard traffic rules and defensive driving techniques. Perform post operating procedures after parking the vehicle.	
Observation: (How will you be assessed as Competent?) Your performance will be assessed based on the following criteria: • Performance of pre and post operating procedures as per standard practices; • Application of standard procedures while starting the LMV; • Demonstrating the driving skills in different road condition using the system of vehicle control (SOVC); • Demonstrating your adherence to RSTA Rules, Defensive Driving; • The final outcome of your driving skills	
Note: For Assessor/Institute for preparation for assessment. Materials and Equipment for 1 candidate • LMV in good running condition with all necessary vehicle documents 2. Roles and responsibilities of assessors (before/during and after assessment) • Identify in advance the different road environment (rough road, town, simulated night and poor light condition, highway) • During assessment let the candidate demonstrate moving off, reversing, overtaking, and parking.	

Assessor/ Observation Check List

Unit of competency	Drive Light Vehicle		
Unit Code	8322-U4-L2		
Module Title	Driving Light Vehicle		
Module Code	8322-U4-L2-M1		
Problem/Project: Drive Light Vehicle	Psychomotor (Practical) domain level: P2		
Candidate's Name:			
Place of Assessment:		Date of Assessment:	
A. During the demonstration of skills did the candidate do following:	Marks allocated	Marks received	Remarks
1. Check mirror settings, fluid level, tire pressure and required documents.	4		
2. Start LMV according to the procedure of standard starting procedure (Cockpit Drill)	2		
3. Move off and steer LMV wearing seat belts and without stalling the engine*	3		
4. Reverse LMV safely without stalling the engine*	3		
5. Park LMV safely in the centre of given parking area following standard parking procedure	2		
6. Drive LMV on the highway according to the road conditions following the road safety signs.	2		
7. Drive LMV in towns according to the traffic signs and signals.	2		
8. Drive LMV on 4WD safely (if necessary and available)	1		
9. Giving pass and overtake the vehicle safely according to the road and weather condition *	3		
10. Stop LMV safely in a given area according to standard stopping procedure	1		
B. Is the job outcome correct in the following areas?			
Caused no accidents and damages to the vehicle.*	5		
Total marks obtained	28		
The Candidate's performance was:	Satisfactory:		
	Not Satisfactory:		

Note: The questions marked with * are the critical questions which the trainees must be able to answer. Otherwise, they will be rated unsuccessful even if they perform well in the practical exam. The mark **P** is for the psychomotor domain level (P1- Simple Routine Assignment; P2- Questions related to Simple Routine Assignment and P3- Questions not related to Simple Routine Assignment)

Oral Questions checklist:

Unit of competency	Drive Light Vehicle			
Unit Code	8322-U4-L2			
Module Title	Driving Light Vehicle			
Module Code	8322-U4-L2-M1			
Problem/Project: Drive Light Vehicle				
Candidate's Name:				
Place of Assessment:		Date of Assessment:		
Questions (and its domain level) to be answered by the trainee / candidate:	Key Answer	Marks allocated	Marks obtained	Remarks
Why do you keep the vehicle in start mode for a few minutes before moving? (Verifying observations) (C1)				
In case of accidents who will you contact first? (contingency questions) (C2)				
While entering intersection, before how many seconds do you have to give signal? (verifying observations) (C3)				
Total Marks Obtained				
The candidate's performance was:		Satisfactory:		
		Not Satisfactory:		
Assessor's Name:		Signature:		

Note: The questions marked with C describes the cognitive level of the questions. C1- Remembering; C2- Functional Understanding and C3- Problem Solving.

Written questions checklist:

Unit of competency	Drive Light Vehicle		
Unit Code	8322-U4-L2		
Module Title	Driving Light Vehicle		
Module Code	8322-U4-L2-M1		
Problem/Project: Drive Light Vehicle			
Candidate's Name:			
Place of Assessment:		Date of Assessment:	
Questions (and its domain level) to be answered by the trainee/ candidate:	Key Answer	Marks Allocated	Marks Obtained
1. List down three types of parking. (Short Answer Question) (C1)	Angle, Straight and Parallel Parking	1	
2. All of the following are honking prohibited places EXCEPT : (C2) a. pedestrian crossing c. traffic jam b. public procession d. curves and bends (Multiple Choice Question)	d	2	
3. According to RSTA Regulations how much is the penalty for drunk driving? (C1)	Nu. 1750	1	
4. Match the following signs in column A with the indications in column B. (Matching Type) (C2) Column A 1.  2.  3.  Prohibited Column B a. Give way b. Restriction End c. Compulsory Ahead d. Pedestrian	1-c, 2-a, 3-d	3	
Total marks obtained			
The Candidate's performance was:	Satisfactory:		
	Not Satisfactory:		
Assessor's Name:		Signature:	

The Candidate's overall result:	Competent:	
	Not Yet Competent:	
Feedback to Candidate: (Provide feedback to the candidate on how they could improve – especially if they are not competent)		

I am satisfied with the way assessment was conducted:	YES	NO
(Please include reasons if not satisfied) Candidate Name: Signature: Date:		

Assessor Name:

Signature:

Training Provider:

Date:

Annex II: Module Recognition

This is to verify that

Mr/Ms.....

has completed module on

.....

Covering following learning outcomes:

1.
....
2.
....
3.
....

Instructor:

Head of the Department:

.....

.....

Signature: **Signature:**

Date: / / (dd/mm/yyyy)
.....(dd/mm/yyyy)

Date: / /

Head of the Institute:
OC:

Trained Assessor (Institute)/Exam

.....

.....

Signature:

Signature:

Date: / ... / (dd/mm/yyyy)

Date: / /(dd/mm/yyyy)

Annex III: Lesson Plan
Lesson Plan

Course Title:		NC Level:
Module Code:		Duration:
Module Title:		
Learning Outcome:		
Skill/Task/Topic:		
Terminal Performance Objective:		
<i>(Note: Write narrative statement extracted from TPO of Task Sheet)</i>		
Enabling Objectives (Related knowledge):		
By the end of the lesson learners will be able to:		
i) ii) iii)		
What (Content/Activity)	Who (T/L)	How (Methods/ Media)
Duration (Min.)	Questions	
<i>Introduction:</i> <i>Main body</i> <i>Conclusion</i>		
Projects/Problems:		
Instructional Resources Plan		
Skills/Task/Topic:		
No. of Trainees:		

Sl. No.:	Instructional materials/resources	Specifications	Qty.	Remarks
Prepared by :		Signature	Date:	
Revised by:		Signature	Date:	
Approved by:		Signature	Date:	

Task sheet

TS-1/4: Practical Plan			
Course Title:		BQFC Level:	
Module code:		Duration:	
Module Title			
Learning outcome			
Skills/Task Title:		Task no:	
Terminal Performance Objective: <i>Given:</i> <i>Cue:</i> <i>Who:</i> <i>What:</i> <i>Within:</i> <i>How well:</i> - - -			
Enabling Objectives (Related Skills): <i>By the end of a lesson, the learners will be able to:</i> i) ii) iii) iv)			
Activities	Who (T/L)	How (methods/ media)	Duration

Project/Assignment:

TS-2/4: Tool and Equipment required:						
Sl no.	Particulars	Specifications	Qty	Remarks		
Training Materials required:						
Sl no.	Particulars	Specifications	Qty.	Rate	Amount	Remarks

TS-3/4: Performance Guide

Skill/Task:

Date:

Directions: Use the following performances criteria to rate the learner. Check YES/NO to indicate whether the leaner performed each step as indicated or not?

Sl. No:	Steps	Yes	No

Note:

Critical steps: All * marked steps should be carried out very carefully. For a quality performance guide, all items should be checked “YES”

TS-4/4: Instruction and Drawing

General Instructions for Trainees

- i)
- ii)
- iii)
- iv)

Drawing (if any)

Safety Precaution i) ii) iii)		
Prepared by :	Signature	Date:
Revised By:	Signature	Date:
Approved by :	Signature	Date:

Institutes letter head and Logo

(Trade)YEAR PLAN- _____ Semester_____ (Year)

Trade:			Schedule																																								Total Hour s	
NC Level:																																												
Modul	Module Title	Learning Outcome	Feb.				March				April				May				June				July				Aug.				Sept				Oct.				Nov.					
Code			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4						

Monthly/Weekly Plan

Month:

Trade:

Trainer:

Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Week 01							
Week 02							
Week 03							
Week 04							
Week 05							

Developed by:

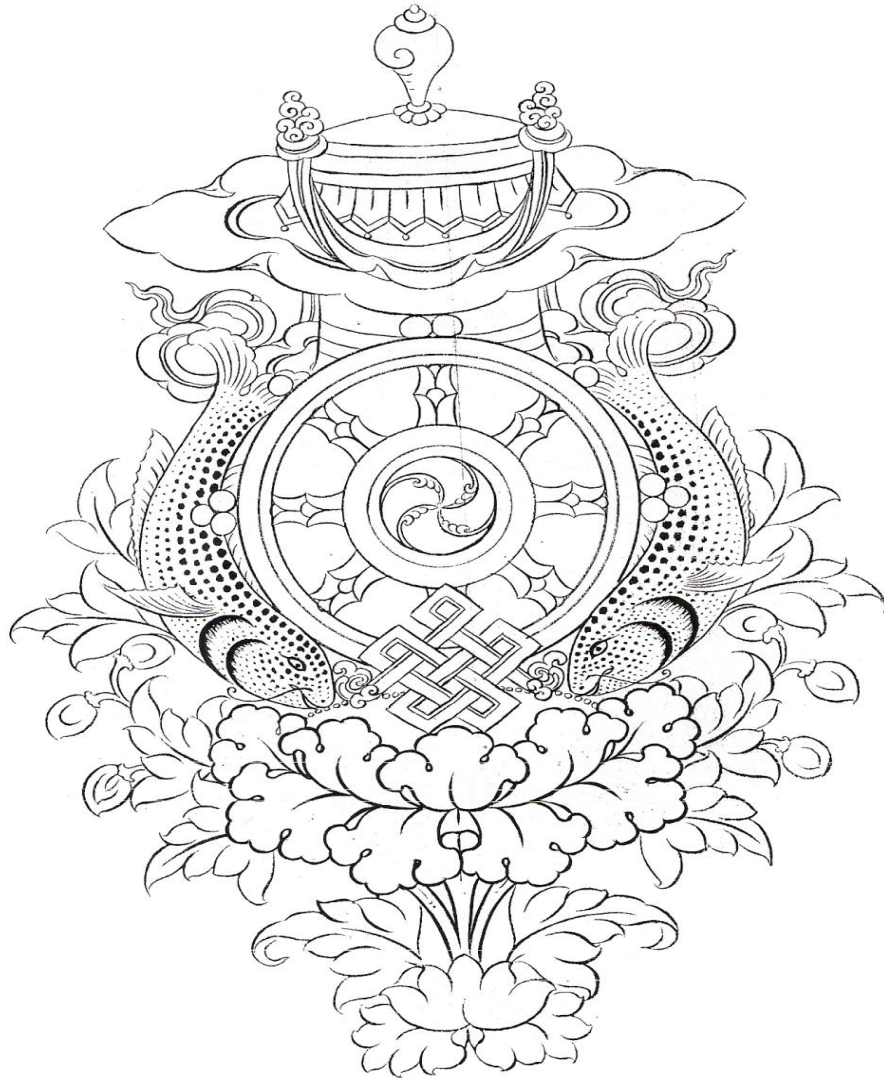
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Date

**Annex V: Time distribution
Mechanical Fitter C3**

Time Distribution					
Mechanical Fitter C3					
Module Title	Learning outcomes	Tasks	Theory (hours)	Practical (hours)	Total (hours)
A: Maintain hydraulic and pneumatic system	A1 Maintain hydraulic system	A1.01 Diagnose faults of hydraulic system	6	6	12
		A1.02 Refill hydraulic oil	2	6	8
		A1.03 Replace pressure gauge	2	18	20
		A1.04 Change hydraulic valves	6	18	24
		A1.05 Replace hydraulic pump	6	12	18
		A1.06 Repair vane pump	4	34	38
		A1.07 Repair axial piston pump	4	34	38
		A1.08 Change hydraulic hose pipe	4	18	22
		A1.09 Chang seal kit of linear actuator	2	10	12
		A1.10 Replace hydraulic motor	4	8	12
		Sub Total Duration	40	164	204
	A2 Maintain pneumatic system	A2.01 Diagnose faults of pneumatic system	2	8	10
		A2.02 Change seal kit of pneumatic cylinder	2	8	10
		A2.03 Change pneumatic valves	2	10	12
		A2.04 Change air hose pipe	1	3	4
		A2.05 Replace FRL	2	4	6
		Sub Total Duration	9	33	42
	A3 Maintain air compressor	A3.01 Diagnose the faults of air compressor	4	12	16
		A3.02 Change compressor oil	2	4	6
		A3.03 Replace air filter	1	5	6
		A3.04 Replace element separator	1	11	12
		A3.05 Replace moister separator	2	4	6
		A3.06 Replace reciprocating air compressor components	4	20	24

		A3.07 Replace components of screw compressor	4	22	26
		A3.08 Service air dryer	4	8	12
		Sub Total	22	86	108
	Total Duration		71	283	354
B: Install simple machines	B1 Prepare for installation of machine	B1.01 Plan for installation	1	4	5
		B1.02 Prepare the installation area	2	6	8
		B1.03 Inspect the installation area	1	3	4
		Sub Total Duration	4	13	17
	B2 Install machine	B2.01 Install centrifugal pump	3	11	14
		B2.02 Install reciprocating pump	3	11	14
		B2.03 Install hydraulic press	3	11	14
		Sub Total Duration	9	33	42
	B3 Perform test run	B3.01 Maintain alignment	2	7	9
		B3.02 Maintain RPM	2	7	9
		B3.03 Maintain vibration	2	7	9
		B3.04 Maintain flow pressure	2	7	9
		Sub Total Duration	8	28	36
	Total Duration		21	74	95
Grand Total Duration(hours)			92	357	449



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