

Vanga Teachers College

***SKILLS DEVELOPMENT
PROGRAMME***

MECHANICS

Course Outline

INTRODUCTION

Throughout the Solomon Islands more and more people are becoming dependent on machinery of various types to generate income, for transport, for power and for cultivation of crops etc. It is becoming more and more important that there are people in the villages who have a sufficient level of knowledge and skills to keep these machines in good working order through the ability to use the machines safely, implement a regular maintenance programme and carry out minor repairs.

It is essential that there be a well trained and skilled workforce to meet these emerging needs. Instructors in Rural Training Centres can play a leading role in delivering these skills to the rural areas of the country.

Machines such as outboard motors and chainsaws are now very common in the villages. Becoming more common are other small engines - generators, agricultural equipment, mowers. In some areas villagers also have trucks and cars that need regular attention.

COURSE OUTLINE

The four major areas covered are:

- Basic hand tools, measuring instruments and general maintenance of machinery
- Chainsaws
- Outboard Motors
- Four stroke engines - Diesel and Petrol. (Generators, Mowers, Power Tillers, truck etc.)

Integrated into the course is component of MATHS called **Maths for Mechanics**. This component will cover aspects of maths that are specifically required by the mechanic.

AIMS:

The aims of this course include the following:

- To provide students with a knowledge of the operation of engines
- To provide students with the skills to safely operate, maintain and repair a variety of engines and machines that are likely to be used in the villages to enhance rural development.

GENERAL OBJECTIVES:

By the conclusion of this course students will be able to:

- Describe the theory of operation of internal combustion engines
- Safely operate a range of machines
- Carry out regular maintenance of machinery
- Identify problems and make repairs
- Use manuals to order correct parts and effect repairs with regard to outboard motors, chainsaws, small petrol and diesel 4-stroke engines.

Students who choose will be presented for the National Trade Test in Diesel Mechanics.

NOTE

It must be assumed that the students taking this course have little previous experience of mechanics or the proper use of tools.

It must also be assumed that the majority of students have a low level of understanding of English and therefore instructors will have to introduce students to the vocabulary of the subject.

SPECIFIC OBJECTIVES

Basic hand tools, measuring instruments and general maintenance of machinery

- ❖ Know and understand the importance of safe workshop practices
- ❖ Know the names of and correct use of basic hand tools of the mechanics workshop.
- ❖ Demonstrate correct use of tools.
- ❖ Know the names of measuring instruments especially micrometer screw gauge, vernier caliper, dial gauge, feeler gauge.
- ❖ Use measuring tools in the workshop situation.
- ❖ Understand the concept of regular maintenance.
- ❖ Assist in the regular programme maintenance of equipment at the Centre.
- ❖ Carry out basic maintenance procedures on a variety of machines, including Outboard motor, chainsaw, motor mower, generator, tractor, sawmill etc.
- ❖ Prepare fuel use in for various machines.

Chainsaw

- ❖ Know the names of the major parts/systems of the engine.
- ❖ Explain the cycle of operation of an Internal Combustion engine.
- ❖ Know safety procedures for chainsaw operation
- ❖ Remove and replace the chain and bar on the chainsaw
- ❖ Sharpen the chain blade
- ❖ Disassemble the chainsaw in a correct manner
- ❖ Remove, repair and replace the clutch system
- ❖ Remove clean/repair, or adjust the carburettor
- ❖ Identify and repair problems in the fuel system
- ❖ Identify and repair problems in the power transmission system
- ❖ Remove and replace piston, piston rings, crankshaft, bearings, oil seals
- ❖ Identify parts and part numbers from the manual
- ❖ Remove repair and replace lubrication system
- ❖ Rebuild the chainsaw to manual specifications

Outboard Engine

- ❖ Know safety procedures for OBM operation.
- ❖ Recognise and identify the various engine parts and systems.
- ❖ Understand the major differences in operations and build of 2-stroke and 4-stroke engines.
- ❖ Remove, repair and replace the elements of the fuel system.
- ❖ Describe the operation of the elements of the fuel system.
- ❖ Adjust the carburettor for optimum operation of the engine.
- ❖ Remove, repair and replace the elements of the ignition system.
- ❖ Describe the operation of the ignition system.
- ❖ Remove, repair and replace the elements of the cooling system.
- ❖ Describe the operation of the cooling system.
- ❖ Remove, repair and replace the elements of the lubrication system.
- ❖ Describe the operation of the lubrication system.
- ❖ Remove, repair and replace the elements of the power transmission system.
- ❖ Describe the operation of the power transmission system.
- ❖ Disassemble the engine to remove crankshaft, bearings, con rods, pistons, piston rings etc.
- ❖ Identify worn/broken parts and order replacement parts.
- ❖ Assemble the engine.

Four Stroke Engines

- ❖ Know the safety procedures of the workshop
- ❖ Understand the different types of fire and the appropriate extinguisher to deploy
- ❖ Apply basic first aid and CPR
- ❖ Read simple drawings and interpret symbols
- ❖ Explain the principles of the four stroke engine, petrol and diesel
- ❖ Explain the engine systems of the engine including the ignition, lubrication, cooling, air intake, exhaust, scavenging, starting, and electrical systems
- ❖ Understand the operation of the following systems: clutch, transmission, brake, suspension and steering systems
- ❖ Disassemble and assemble a multi cylinder four stroke engine
- ❖ Demonstrate the correct use of tools
- ❖ Demonstrate an ordered approach to storage of disassembles parts
- ❖ Demonstrate a logical procedure in assembling the engine
- ❖ Test the engine and systems as they are assembled.

1.2 MATHS FOR MECHANICS

- ❖ Using the calculator
- ❖ Add, Subtract, Multiply and Divide
- ❖ Lengths, areas and volumes
- ❖ Simple ratios, scales
- ❖ Right angle triangles
- ❖ Angles (eg for closing and opening of valves)
- ❖ Significant Figures (tolerances)
- ❖ Reading Tables (eg Roofing, Stairs)
- ❖ Reading gauges (eg. Pressure, Dial gauge)
- ❖ Costing and quoting

ASSESSMENT

Assessment is competency Based.

Practical assessment will be competency based and will be carried out during each stage of the cycle. Each student will be required to complete the set practical exercises to the standard required by the instructor. Such standards will be made known to the students at the start of the cycle.

A record of competency achievement will be kept for each student. The record sheet will correspond to the specific objectives listed for each Term.

Mechanics Competencies

Tick ✓
when
judged
competent

NAME: _____

ITEM	DESCRIPTION	
1	Know and understand the importance of safe workshop practices	
2	Know the names of and correct use of basic hand tools of the mechanics workshop.	
3	Demonstrate correct use of tools.	
4	Know the names of measuring instruments especially micrometer screw gauge, vernier caliper, dial gauge, feeler gauge.	
5	Use measuring tools in the workshop situation	
6	Understand the concept of regular maintenance.	
7	Assist in the regular programme maintenance of equipment at the Centre.	
8	Carry out basic maintenance procedures on a variety of machines, including Outboard motor, chainsaw, motor mower, generator, tractor, sawmill etc.	
9	Prepare fuel use in for various machines.	
10	Know the names of the major parts/systems of the engine.	
11	Explain the cycle of operation of an Internal Combustion engine.	
12	Know safety procedures for OBM operation.	
13	Recognise and identify the various engine parts and systems.	
14	Understand the major differences in operations and build of 2-stroke and 4-stroke engines.	
15	Remove, repair and replace the elements of the fuel system.	
16	Describe the operation of the elements of the fuel system.	
17	Adjust the carburettor for optimum operation of the engine.	
18	Remove, repair and replace the elements of the ignition system.	
19	Describe the operation of the ignition system.	
20	Remove, repair and replace the elements of the cooling system.	
21	Describe the operation of the cooling system.	
22	Remove, repair and replace the elements of the lubrication system.	
23	Describe the operation of the lubrication system.	
24	Remove, repair and replace the elements of the power transmission system.	
25	Describe the operation of the power transmission system.	
26	Disassemble the engine to remove crankshaft, bearings, con rods, pistons, piston rings etc.	
27	Identify worn/broken parts and order replacement parts.	
28	Assemble the engine	
29	Know safety procedures for chainsaw operation	
30	Remove and replace the chain and bar on the chainsaw	
31	Sharpen the chain blade	
32	Disassemble the chainsaw in a correct manner	
33	Remove, repair and replace the clutch system	
34	Remove clean/repair, or adjust the carburettor	
35	Identify and repair problems in the fuel system	
36	Identify and repair problems in the power transmission system	
37	Remove and replace piston, piston rings, crankshaft, bearings, oil seals	
38	Identify parts and part numbers from the manual	
39	Remove repair and replace lubrication system	
40	Rebuild the chainsaw to manual specifications	
41	Know the safety procedures of the workshop	
42	Understand the different types of fire and the appropriate extinguisher to deploy	
43	Apply basic first aid and CPR	
44	Read simple drawings and interpret symbols	
45	Explain the principles of the four stroke engine, petrol and diesel	
46	Explain the engine systems of the engine including the ignition, lubrication, cooling, air intake, exhaust, scavenging, starting, and electrical systems	
47	Understand the operation of the following systems: clutch, transmission, brake, suspension and steering systems	
48	Disassemble and assemble a multi cylinder four stroke engine	
49	Demonstrate the correct use of tools	

ITEM	DESCRIPTION	
50	Demonstrate an ordered approach to storage of disassembles parts	
51	Demonstrate a logical procedure in assembling the engine	
52	Test the engine and systems as they are assembled.	