

**Motor Vehicle Mechanics' Work - National Technical
Certificate (NTC) and Advanced National Technical
Certificate (ANTC)**

Engine Reconditioning: Petrol & Diesel

PROGRAMME:	NATIONAL TECHNICAL CERTIFICATE IN MOTOR VEHICLE MECHANICS' WORK
MODULE:	CMV 13 ENGINE RECONDITIONING: PETROL & DIESEL
DURATION:	96 HOURS
GOAL:	The trainee will acquire knowledge and skills to recondition a worn out engine (petrol or diesel) to a satisfactory working condition.

GENERAL OBJECTIVES:

On completion of this module, the trainee should be able to:-

1. Understand the safety procedures and their applications in relation to automobile engine reconditioning.
2. Understand the operation of all types of automobile engine and recondition worn out engine to good working condition.
3. Understand the process of carrying out cylinder reboring.
4. Understand the method of grinding crankshaft to manufacturer's specifications.

PROGRAMME: NTC IN MOTOR VEHICLE MECHANICS' WORK			
COURSE: ENGINE RECONDITIONING: PETROL & DIESEL		Course Code: CMV 13	Contact Hours: 8hrs/week
Course Specification: Theoretical			
General Objective 1.0: Understand the safety procedure and their applications in relation to automobile engine reconditioning			
Week	Specific Learning Outcome	Teachers Activities	Resources
1	1.1 Understand safety and observe safety working condition 1.2 Use of service Manual 1.3 Use service Tools 1.4 Complete jobs to manufacturers' specifications	<ul style="list-style-type: none"> • Discuss the safety in the workshop with volatile liquid in the engine system. • Care of engine components • Care of measuring tools • Danger of oils on the floor and gang ways • Correct Dressing • Explain the importance of service manual to ensure the long life of the engine • Explain the advantages of using the correct tools • Explain the danger of ignoring manufacturers' specifications • Assess the students 	<ul style="list-style-type: none"> • Lesson plan • Wall charts • Films • Chalk board • Service manual

PROGRAMME: NTC IN MOTOR VEHICLE MECHANICS' WORK			
COURSE: ENGINE RECONDITIONING: PETROL & DIESEL		Course Code: CMV 13	Contact Hours: 8hrs/week
General Objective 2.0: Understand the operation of all types of automobile engine and recondition worn out engine to good working condition			
Week	Specific Learning Outcome	Teachers Activities	Resources
2	2.1 Explain the operation of all types of automobile engines 2.2 State the operations involved in engine overhaul 2.3 Identify and use various tools and equipment for repair or adjustment of components parts of the engine assembly 2.4 Explain how to diagnose faults by inspection and by Road Test	<ul style="list-style-type: none"> • Explain:- • The 4-stroke spark ignition engine construction and operating principles • The diesel engine design features • The Four Stroke diesel Engine Operating principle • Explain the different cylinder arrangements, principle of fitting cylinder liners, valves, valve guide, and set tappets 	<ul style="list-style-type: none"> • Lesson plan, wall charts • Chalk board • Petrol engine • Diesel engine • Tools catalogue • A functional motorvehicle
4-5	2.5 Remove engine from vehicle for overhauling 2.6 Dismantle engine following a proper sequence 2.7 Apply the concept of limits and fits in relation to effects and requirements of engine components and other parts in assembling operation e.g. Piston free play, crank shaft sizes 2.8 Know how to assess suitability of existing parts for possible re-use. 2.9 Know how to measure and determine sizes of worn crank shaft journals and crank pins	<ul style="list-style-type: none"> • Select tools for identified jobs • Select special tools for special jobs • Explain the procedure for removal of engine from vehicle • Explain the use of lifting devices • Explain dismantling procedure • Explain and demonstrate different types of limits and fits, interference fits, push fits, clearance jobs, and relate its applications to various components of the automobile system e.g. Piston and cylinder • Explain the process of examining and measuring parts using manufacturers' manual as a guide • Explain the use of measuring instruments such as vernier caliper, micrometer, dial gauge to determine the extent of wear on a component making reference to service manual. 	<ul style="list-style-type: none"> • Lesson plan • Wall charts • Chalk board • Engine Hoist • A Vehicle • on limits and Fits • Measuring tools • Service manuals

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General Objective 2.0: Understand the operation of all types of automobile engine and recondition worn out engine to good working condition			
Week	Specific Learning Outcome	Teachers Activities	Resources
6-7	<p>2.10 Describe cam shaft arrangements for side and overhead camshafts</p> <p>2.11 Explain the concept of force, torque and brake horse power as applicable to motor vehicle</p> <p>2.12 Explain the process of replacement of defective components e.g. bearings, cylinder sleeves, Pistons, crank shafts, connecting rods, valve assembly etc</p> <p>2.13 Explain ways of reassembling engine components in given sequence, adjust and test run engine</p>	<ul style="list-style-type: none"> • Explain the methods of drawing cam shaft • Describe simple treatment of bell cranked pivoted levers to show (a) the perpendicular forces and (b) Inclined forces. Simple calculations involving moments as applied to clutch and brake mechanisms, calculation of torques • Explain and demonstrate the processes of • Assembling Pistons and rings using clamp • Fitting of cylinder liners • Fitting of valve guides and valve seat inserts • Fitting of roller & ball bearing, • Use of torque wrenches • Describe sequentially the reassembling of engine components, how to make necessary adjustments. Explain the test run procedure • Assess the students 	<ul style="list-style-type: none"> • Lesson plan • Chalk board • Wall charts • camshaft and model • Chalk board
General Objective 3.0: Understand the process of carrying out cylinder reboring			
Week	Specific Learning Outcome	Teachers Activities	Resources
8-9	<p>3.1 Explain the processes of cylinder reboring</p> <p>3.2 Explain the use of sizes in determining the bore size</p> <p>3.3 Explain how to rebore cylinder to the required specification and select rings and piston sizes to match</p>	<ul style="list-style-type: none"> • Explain the process of:- Setting the cylinder on reboring machine Setting the boring tools on the reboring machine Checking the accuracy of the boring tool and cylinder setting Using service manual to determine the correct bore size Selecting correct sizes of rings, and pistons from the manufacturer's manual Assess the students 	<ul style="list-style-type: none"> • Lesson plan • Service manual • Flip chart • Boring machine • Vernier calipers • Chalk board • Sizing tools • Pistons • Rings etc.

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COURSE: ENGINE RECONDITIONING: PETROL & DIESEL		Course Code: CMV 13	Contact Hours: 8hrs/week
General Objective 4.0: Grind Crankshaft to correct specifications			
Week	Specific Learning Outcome	Teachers Activities	Resources
10-12	4.1 Explain the process of crank shaft grinding 4.2 Explain the sizes of bearing to fit what sizes of crank shafts 4.3 Explain how to check crank shaft sizes before grinding 4.4 Explain how to grind crankshaft to appropriate sizes and fits	<ul style="list-style-type: none"> • Explain, using diagrams and models the process of crank shaft grinding • Using the manufacturer's manual, find the size of bearing to suit the crankshaft size • Ask the students to: • Measure the crankshaft size using micrometer looking up for next correct size from manual • Demonstrate the process of mounting crankshaft on the crankshaft-grinding machine. Grind to the correct size using outside micrometer to check • Assess the students 	<ul style="list-style-type: none"> • Lesson plan, Chalk board, Crankshaft, Grinding tools • service manual chalk board • Lesson plan, Service manual Micrometer • models Crankshaft Grinding tools

Course Specification: PRACTICAL CONTENTS			
General Objective 1.0: To carryout maintenance operations in motor vehicle			
Week	Specific Learning Outcome:	Teachers Activities	Resources
1	• Check the alignment and	• The teacher should demonstrate each	• Pistons
2-4	realignment of connecting rods	• Demonstrate each of the practical items	• Gudgeon pins
	• Check big-end bearing clearances	• Ensure that student use the correct tools	• Feeler gauges
5-7	• Assemble big end bearings Use of torque wrench	• Ensure that the students work with the correct procedure and standard practice	• Engine blocks
8-9	• Use instruments and special fixtures to diagnose engine faults		• Connecting rods
10-12	• Dismantle, inspect, assemble and adjust diesel engine		• Big end bearing
			• Torque wrench
			• Live engine
			• Engine oil
			• Oil filter
			• Injectors
			• Spark plugs

Course Specification: PRACTICAL CONTENTS

General Objective 1.0: To carryout maintenance operations in motor vehicle

Week	Specific Learning_Outcome:	Teachers Activities	Resources
	<p>• Examination of engines having different arrangement of cylinder:</p> <ul style="list-style-type: none"> a. Fitting of cylinder liners b. Fitting of valve guides c. Fitting of valve seat inserts d. Fitting big end bearings e. Dismantling, examination of rocker and bearing for wear f. Dismantling, examining, assemblingand testing of petrol pumps <p>EVALUATION GUIDE</p> <p>Questions should include Essays, and multiple choice questions to cover the following areas (1) Engines (a) Spark ignition engine (2) Compression ignition engine(2) Valves (3) Cylinder (4) Crank shafts (5)Lubrication (6) Camshafts(7) Pistons and rings (8) Valve timing (9) Ignition timing etc</p> <p>Practical Assessment should account for 60% of assessment profile</p>		