



Republic of the Philippines

Department of Education

DepEd Complex, Meralco Avenue, Pasig City

STRENGTHENED SENIOR HIGH SCHOOL CURRICULUM

AUTOMOTIVE SERVICING

(ENGINE AND CHASSIS REPAIRS)

Grade 12

Course Description:

This course subject equips learners with essential skills for Automotive Servicing following industry standards, focusing on engine repair such as engine cooling and lubricating systems, engine intake and exhaust systems, overhaul mechanical systems, and chassis repair such as drive lines, clutch system, manual transmission/transaxle, differential, brake system, steering system, suspension system. Upon completion learners are eligible to take assessments to earn National Certifications level II in Automotive Servicing (Engine Repair) and/or (Chassis Repair), higher education, and careers relative automotive industry sectors.

Elective: Technical Professional

Prerequisite: Driving and Automotive Servicing

Time Allotment: 320 hours for one semester, 16 hours per week

Schedule: First/Second Semester

Quarter 1

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| Content Standard | The learners demonstrate an understanding of the concepts, principles and processes of automotive engine repair. | |
| Performance Standard | The learners perform automotive repair of engine cooling system, lubricating systems, intake and exhaust systems, overhaul mechanical systems, and costing of services employing appropriate safety precautions. | |
| Learning Competencies | | Content |
| 1. Discuss the overview of automotive engine repair | | Overview of Automotive Engine Repair <ul style="list-style-type: none"> • Career and business opportunities • Emerging Trends and Advancement Technology |
| 2. Perform procedures in repairing engine cooling system | | Procedures in Repairing Cooling System <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in repairing cooling system |

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| | <ul style="list-style-type: none"> • Disassembly and Assembly Procedures • Repairing Procedures • Adjustments Procedures • Releasing Procedures • Final Inspection, Test Drive, and Cleaning • Documentation Review and Service Record Keeping • Hand-over Process • Post Work Processes |
| <p>3. Perform procedures in repairing lubricating system</p> | <p>Procedures in Repairing Lubricating System</p> <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in repairing lubricating system • Disassembly and Assembly Procedures • Adjustments Procedures • Releasing Procedures <ul style="list-style-type: none"> ○ Final Inspection, Test Drive, and Cleaning ○ Documentation Review and Service Record Keeping ○ Hand-over Process ○ Post Work Processes |
| <p>4. Perform procedures in repairing the engine intake and exhaust system</p> | <p>Procedures in Repairing Engine Intake and Exhaust System</p> <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in repairing engine intake and exhaust system • Disassembly and Assembly Procedures • Cleaning Procedure <ul style="list-style-type: none"> ○ Intake and Exhaust Manifold ○ Exhaust Gas Recirculation Service • Repair/Replacement Procedures |

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| | <ul style="list-style-type: none"> • Releasing Procedures <ul style="list-style-type: none"> ○ Final Inspection, Test Drive, and Cleaning ○ Documentation Review and Service Record Keeping ○ Hand-over Process ○ Post Work Processes |
| <p>5. Perform procedures in overhauling the engine mechanical system</p> | <p>Procedures in Overhauling Mechanical System</p> <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in overhauling mechanical system • Disassembly and Assembly Procedures of Engine Component • Adjustments Procedures • Releasing Procedures <ul style="list-style-type: none"> ○ Final Inspection, Test Drive, and Cleaning ○ Documentation Review and Service Record Keeping ○ Hand-over Process ○ Post Work Processes |
| <p>6. Calculate the service cost for engine services</p> | <p>Service Costing for Engine Services</p> <ul style="list-style-type: none"> • standard rate • material costs • manpower (labor cost) • overhead costs |

Quarter 2

| Content Standard | The learners demonstrate an understanding of the concepts, principles and processes of automotive chassis repair. |
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| Performance Standard | The learners perform automotive repair of drive lines, clutch system, manual transmission/transaxle, differential, brake system, steering system, suspension system and costing of services employing appropriate safety precautions. |
| Learning Competencies | Content |
| 1. Discuss the overview of automotive chassis repair | <p>Overview of Automotive Chassis Repair</p> <ul style="list-style-type: none"> • Career and Business Opportunities • Emerging Trends in automotive chassis repair |
| 2. Perform the procedures in troubleshooting drive lines. | <p>Drive lines</p> <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in troubleshooting drive lines • Possible defects and corrective action • Troubleshooting procedure • Disassembly and assembly • Testing |
| 3. Perform the procedures in troubleshooting the clutch system. | <p>Clutch system</p> <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in troubleshooting clutch system • Possible defects and corrective action • Troubleshooting procedure • Disassembly and assembly • Testing |

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| <p>4. Perform the procedures in troubleshooting and overhauling manual transmission/transaxle.</p> | <p>Manual transmission/ transaxle</p> <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in troubleshooting and overhauling manual transmission/transaxle • Possible defects and corrective action • Troubleshooting procedure • Disassembly and assembly • Testing |
| <p>5. Perform procedures in troubleshooting differential.</p> | <p>Differential</p> <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in troubleshooting differential • Possible defects and corrective action • Troubleshooting procedure • Disassembly and assembly • Testing |
| <p>6. Perform procedures in troubleshooting the brake system.</p> | <p>Brake system</p> <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in troubleshooting brake system • Possible defects and corrective action • Troubleshooting procedure • Disassembly and assembly • Testing |
| <p>7. Perform procedures in troubleshooting the steering system.</p> | <p>Steering system</p> <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in troubleshooting steering system |

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| | <ul style="list-style-type: none"> • Possible defects and corrective action • Troubleshooting procedure • Disassembly and assembly • Testing |
| 8. Perform procedures in troubleshooting the suspension system. | <p>Suspension system</p> <ul style="list-style-type: none"> • Construction, components and functions and principles • Required items in troubleshooting suspension system • Possible defects and corrective action • Troubleshooting procedure • Disassembly and assembly • Wheel alignment • Testing |
| 9. Discuss vehicle releasing procedures | <p>Releasing Procedures of the Vehicle</p> <ul style="list-style-type: none"> • Final Inspection, Test Drive, and Cleaning • Documentation Review and Service Record Keeping • Hand-over Process • Post Work Processes <ul style="list-style-type: none"> ○ Evaluation ○ Job review |
| 10. Calculate the cost of chassis services | <p>Service Costing for Chassis Services</p> <ul style="list-style-type: none"> • standard rate • manpower (labor cost) • material costs • overhead costs |

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GLOSSARY

Automotive Servicing – the practice of inspecting, maintaining, and repairing vehicles to ensure they are safe and functional.

Automotive Chassis Repair – the process of diagnosing, fixing, or replacing parts of the vehicle's frame and components, including suspension, steering, and drive lines.

Automotive Engine – the main power unit of a vehicle that converts fuel into mechanical energy to move the car.

Automotive Engine Operating System – a combination of systems (cooling, lubrication, intake, exhaust, and mechanical) that ensure the engine's efficient operation.

Automotive Pre-Servicing – preparation and inspection of a vehicle before it is sold or used, ensuring all components function correctly.

Automotive System Components – parts that make up a vehicle's major systems, including the drivetrain, brakes, suspension, steering, and electrical system.

Brake System – a safety mechanism in vehicles that uses friction to stop or slow the car.

Career and Business Opportunities – job or entrepreneurial prospects in the automotive industry, including servicing, repair, and maintenance.

Chassis – the framework of a vehicle to which all components are attached, including the drivetrain, suspension, and wheels.

Class A/B/C Vehicles – classifications of vehicles based on size, weight, and purpose.

Clutch System – a component in manual transmission vehicles that disconnects the engine from the drivetrain for smooth gear changes.

Consumables – items used during servicing or repairs, such as oil, brake fluid, and filters.

Differential – a gear system in the drivetrain that allows wheels to rotate at different speeds during turns.

Documentation – records of vehicle service history, repairs, and inspections for reference and compliance.

Drivetrain – components that deliver power from the engine to the wheels, including the transmission, differential, and drive shafts.

Electric Power Vehicles – cars powered by electric motors instead of internal combustion engines.

Emerging Trends – new technologies, methods, or practices developing in the automotive servicing field.

Engine Cooling System – the mechanism that regulates engine temperature to prevent overheating.

Engine Lubrication System – the system responsible for reducing friction between moving parts and ensuring smooth operation.

Factory-Loaded Parts – components provided with a new vehicle, such as spare tires, tools, and manuals.

Intake System – components responsible for delivering air to the engine for combustion.

Intake and Exhaust Manifold – channels that distribute air into the engine or expel gases out of it.

Hybrid Vehicles – cars using a combination of an internal combustion engine and an electric motor for propulsion.

Jacks and Lifters – tools used to lift vehicles for inspection, maintenance, or repairs.

License Acquisition Requirements – necessary qualifications and processes for obtaining a driver's license or vehicle registration.

Light Vehicles – passenger cars or small trucks with a gross vehicle weight of less than 3.5 tons.

Manual Transmission – a type of transmission requiring manual gear changes by the driver, using a clutch pedal and gear lever.

Maintenance Procedures – actions performed regularly to ensure a vehicle remains in good working condition.

Periodic Maintenance Service (PMS) – routine inspections and servicing of a vehicle to prevent breakdowns and maintain performance.

Power Source – the origin of a vehicle's energy, such as petrol, diesel, electricity, or hybrid systems.

Pre-Delivery Inspection (PDI) – a comprehensive check performed before a new vehicle is delivered to the customer.

Receiving Procedures – steps followed when accepting a vehicle for servicing, including initial inspection and documentation.

Road Emergency Responses – appropriate actions taken during vehicle breakdowns, accidents, or other emergencies on the road.

Service Costing – the process of calculating the total cost of servicing, including labor, materials, and overhead expenses.

Steering System – the mechanism that allows the driver to control the vehicle's direction.

Suspension System – the components connecting the chassis to the wheels, providing stability and comfort.

Traffic Rules and Regulations – laws governing vehicle operation to ensure road safety.

Traffic Signs and Road Markers – visual cues that guide drivers and regulate traffic flow.

Vehicle Specification – details about a vehicle's design, performance, and capacity.

Vehicle System Components – the main systems in a vehicle, such as the engine, drivetrain, and braking system.

TOOLS, MATERIALS, AND EQUIPMENT for AUTOMOTIVE SERVICING (ENGINE REPAIR)

| TOOLS | MATERIALS | EQUIPMENT |
|---|--|---|
| Standard Hand Tools | Chemical degreaser | Training engine (in-line type, model year: 2000 and up) |
| Crankshaft pulley holder (or equivalent) | Cotton gloves | Training vehicle (model year: 2000 and up) |
| Torque wrench (range: 10-40 N-m) | Cotton rags | Air compressor (1Hp) |
| Torque angle gauge | Apron | Cleaner spray gun (for chemical degreaser) |
| Micrometer set (range: 0-25 mm, 25-50 mm, 50-75 mm, 75-100mm) Accuracy: 0.01mm | Plastigauge, red | Engine stand |
| Micrometer stand | Plastigauge, green | Engine hydraulic crane (2 tons) |
| Bore gauge set (range: 15-60 mm) Accuracy 0.01 mm | Plastigauge, blue | Worktable |
| Bore gauge set (range: 50-160 mm) Accuracy: 0.01 mm | Overhauling gasket set | Stainless overhauling pan |
| Dial Gauge (Accuracy: 0.01 mm) w/ magnetic stand | Gasket sealant (Form In-place Gasket: FIPG) | Water heater |

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| Compression gauge, universal (gas and diesel) | Steel spatula (width: 1 inch) | Valve grinder |
| Vernier caliper | Steel brush (Fine) | Vehicle lifter, 3 tons |
| Feeler gauge | Contact cleaners | Valve refacer |
| Straight edge | Grinding compound, fine | Crocodile jack, 2 tons |
| Surface plate (or equivalent) | Grinding compound, coarse | Jack stand |
| V-Blocks | Penetrating oil | Trolley |
| Valve spring compressor | Engine oil | Bench vise |
| Piston ring expander | Belt dressing | Oil bucket |
| Piston ring compressor | Wheel wedge | Hydraulic press |
| Mechanic stethoscope | Valve Grinding stick | Chain block, 2 tons |
| Ridge reamer | Emery cloth (Crocus) | |
| Honing | PPEs | |
| Oiler, 300ml cap. | First-Aid Kit | |
| Steel square, 8" | Kerosene | |
| Inside dial caliper, 5-10mm | Stamp pad | |
| Inside dial caliper, 10-20mm | Prussian blue | |
| Radiator pressure tester | Shop rags (paper towel) | |
| Belt tension gauge | | |
| Thermometer, service type | | |
| Multi-tester, digital | | |
| Glass beaker, 1L cap. | | |
| Oil pressure gauge | | |
| Flower -type sockets | | |
| Flower-type deep socket | | |
| Allen wrench | | |
| Torque wrench (range: 50-100 N-m) | | |
| Snap ring plier | | |
| 1 set Flower -type sockets | | |
| 1 set Flower-type deep socket | | |
| 5 sets Allen wrench | | |
| 5 pcs Torque wrench (range: 50-100 N-m) | | |
| 5 pcs Snap ring plier | | |

TOOLS, MATERIALS, AND EQUIPMENT for AUTOMOTIVE SERVICING (CHASSIS REPAIR)

| TOOLS | | MATERIALS | | EQUIPMENT | |
|--------|--|-----------|--|-----------|-------------------------------------|
| QTY | DESCRIPTION | QTY | DESCRIPTION | QTY | DESCRIPTION |
| 4 sets | Standard technician hand tools | 1 unit | Training vehicle (light) with manual transmission, (model year: 2000 and up) | 5 cans | Grease (500mg/can) |
| 2 pcs | Dial gauge with magnetic stand | 2 units | Manual transmission | 2 cans | Penetrating oil (500ml/cans) |
| 4 pcs | Vernier caliper | 2 units | Manual transaxle | 25 pcs | Rags |
| 2 pcs | Torque wrench (30 kgf- cm) | 2 units | Crocodile jack, 3 tons | 8 L | Gear oil |
| 2 pcs | Torque wrench (230 kgf- cm) | 8 units | Safety stand (for crocodile jack use only) | 8 L | Engine oil |
| 2 pcs | Torque wrench (460 kgf- cm) | 1 unit | Lifter, 3 tons | 2 L | Brake fluid |
| 2 pcs | Torque wrench (920 kgf- cm) | 1 unit | Transmission jack (for lifter), 1 ton | 5 sets | Mop |
| 2 pcs | Torque wrench (1900 kgf- cm) | 1 unit | Air reel | 5 units | Trash bins, 10 L |
| 2 pcs | Torque wrench (2800 kgf- cm) | 1 unit | Electrical reel | 2 rolls | Electrical tape |
| 5 pcs | Plug (prevent oil leakage from transmission) | 1 unit | Workshop air compressor with air line, 2hp | 100 grams | lithium soap base glycol grease |
| 2 pcs | Puller (to remove flange coupling lock nut) | 1 unit | Electric drill | 4 sets | Caliper brake overhauling (O/H) kit |
| 2 pcs | Puller (to remove flange coupling) | 5 units | Air dust gun | 2 liters | Power steering fluid |
| 2 pcs | Puller (to remove spider bearing) | 4 units | Work bench with vise | 4 sets | Drum brake overhauling (O/H) kit |
| 1 pc | Puller (for removing the drive shaft) | 1 unit | Hydraulic press, 1 ton | 2 sets | Brake wheel cylinder repair kit |
| 1 pc | Puller (for removing the axle shaft) | 1 unit | Bench Grinder, 1hp | 12 pcs | Sandpaper, assorted |
| 2 pcs | Puller (for removing transmission gears) | 1 unit | Tracking gauge for measuring toe angle | 2 pcs | Tailor Chalk |
| 2 pcs | Surface plate, 30cmx30cm | 2 units | Turning radius gauge | 4 pcs | Container (for bleeding fluid) |

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| 2 pcs | Drive shaft nut chisel (for un staking the front axle shaft nut) | 1 unit | Camber-caster-kingpin Gauge | 4 pcs | Tray, aluminum, 20cmx20cm |
| 4 pcs | V block | 1 unit | Wheel balancer | 4 pcs. | Vinyl hose (2 m) |
| 4 pcs | Union nut wrench (10 mm)* | 1 unit | Grease gun | 10 pcs | Adjusting bolt (of various sizes)* |
| 4 pcs | Snap ring expander | 8 pcs | Wheel wedge | 1 tube | Mechanic blue, 200ml |
| 4 pcs | Hexagon socket wrench (6 mm)* | 1 pc | Creeper | 1 box | Brake cleaner |
| 4 pcs | Hexagon socket wrench (8 mm)* | 1 pc | Trouble light | 1 can | Degreaser, 450ml |
| 4 pcs | Pin punch (5mm)* | 1 pc | Oil bucket, 20L cap. | 2 tubes | Sealant |
| 4 pcs | Plastic hammer | 1 pc | Drain pan, 20L cap. | 5 sachets | Soap detergent |
| 5 pcs | Ball peen hammer, 1lb | 1 pc | Differential stand | 1 set | First aid kit |
| 4 pcs | Micrometer (0 – 25mm) | 1 unit | Wheel aligner | 1 unit | Fire extinguisher, 5 lbs, ABC |
| 4 pcs | Caliper gauge | | | 1 gallon | 70% alcohol** |
| 4 pcs | Inside diameter measuring tools | | | 4 pcs | Manual References: -Repair manuals -Workshop |
| 1 set | Drill bit set | | | | PPEs: |
| 1 set | Screw extractor set | | | 25 pairs | Gloves |
| 2 pcs | Steering wheel puller | | | 10 pcs | Hard hat |
| 2 pcs | Torx driver (6mm) | | | 25 pairs | Safety shoes |
| 2 pcs | Torx driver (8mm) | | | 25 pcs | Cover all |
| 4 pcs | Rack & pinion holder | | | 25 pcs | Face mask |
| 4 pcs | Steering adjustable wrench | | | 25 pcs | Goggles |
| 4 pcs | Hexagon wrench (24mm) | | | 25 pcs | Face shield** |
| 4 pcs | Cylinder stopper wrench | | | | |
| 4 pcs | Pinion shaft wrench | | | | |
| 4 pcs | Stainless Steel Ruler, 12” | | | | |
| 4 pcs | Union nut wrench (10mm) | | | | |
| 4 pcs | Coil spring compressor | | | | |
| 4 pcs | Ball joint puller | | | | |

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|-------|---|--|--|--|--|
| 1 set | Clutch aligner | | | | |
| 1 pc | Grease gun | | | | |
| 1 pc | Tire gauge | | | | |
| 5 pcs | Feeler gauge | | | | |
| 2 pcs | C-clamp | | | | |
| 2 pcs | Wheel wedge | | | | |
| 1 pc | Pilot bearing puller | | | | |
| 4 pcs | Brake bleeder | | | | |
| 1 pc | Tire pressure gauge, ball pen type | | | | |
| 2 pcs | SST (prevent oil leakage from transmission)* | | | | |
| 2 pcs | SST (puller for removing transmission gears)* | | | | |
| 2 pcs | SST (to remove flange coupling lock nut)* | | | | |
| 2 pcs | SST (to remove flange coupling)* | | | | |
| 2 pcs | Special tools (such as sliding hammer)* | | | | |