



Project No.
28002

Date
2025

Doc. No.
EOTSS28002

Serial No
28002/2025

Rev.
00

Proj. dep.
Technical

EOTSS Doc. CODE :

EOTSS/Technical/28002ME-TECH/2025



المعهد الهندسي لخدمات التكنولوجيا والبرمجيات

Engineering office for Technology and Software Services

Engine Maintenance and Repair



 **Detailed Course Plan for "Engine Maintenance and Repair"**
Code: 28002ME-TECH

Course Objectives

- Gain a deep understanding of the **types, components, and operation principles** of engines.
- Acquire **hands-on skills** in diagnosing, maintaining, and repairing engine systems.
- Learn to troubleshoot **mechanical, electrical, cooling, and lubrication issues**.

Introduction

Engines are the heart of any mechanical system — from vehicles to generators and industrial machinery. This course provides a **comprehensive foundation** in engine types, internal components, failure modes, and modern diagnostic techniques. The course is built for technicians seeking to **enhance their engine servicing capabilities** with practical, workshop-based learning.

Main Branch: United building – E Shams –Front NBE
, El Siouf _Alexandria

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Course Description

This 6-week intensive course offers both **theoretical knowledge** and **practical workshop training** in internal combustion engines (ICE). It focuses on **routine maintenance, fault diagnosis, and systematic repairs** using modern tools. The course also covers **electrical and cooling subsystems**, enabling technicians to confidently service various engine types in real-world applications.



Target Audience

- **Automotive and mechanical technicians** handling engines in workshops or field service.
- Maintenance teams in **transport, manufacturing, agriculture, or industrial plants**.
- **Technical students** with a foundation in mechanics aiming to specialize in engines.
- Anyone responsible for the **upkeep of engine-powered systems**.



What You Will Learn

- ✓ Identify types and functions of engine components.
- ✓ Differentiate between **internal and external combustion engines**.
- ✓ Understand common engine faults and their **causes**.
- ✓ Perform diagnostic procedures using **modern testing tools**.
- ✓ Service and repair **electrical, lubrication, and cooling subsystems**.
- ✓ Interpret and document **engine performance and repair reports**.



Materials Included

- Engine **cutaway diagrams and animations**.
- Fault diagnosis charts and checklists.
- Access to **real engines for disassembly and testing**.
- **Multimeter and OBD diagnostic tool usage guides**.
- Templates for **inspection and service reports**.



Requirements / Instructions

- **Prerequisites:**
Familiarity with mechanical fundamentals and basic tool usage.
- **Attendance:**
4 sessions weekly for 6 weeks (24 sessions total).

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- **Workshop Safety:**
PPE is mandatory during lab sessions.
- A final **practical exam** and written assessment must be completed.



Course Duration



6 Weeks — 4 Sessions per Week

Balancing theoretical learning and **hands-on practice** in workshop environments.



Course Content Outline

- ◆ **Week 1: Introduction to Engine Types and Operation**
 - **Session 1:** Internal vs External Combustion Engines
 - **Session 2:** 2-Stroke vs 4-Stroke Engines
 - **Session 3:** Diesel vs Petrol Engine Comparison
 - **Session 4:** Engine Cycle Simulation (Live Demo/Animation)
- ◆ **Week 2: Engine Components and Functionality**
 - **Session 5:** Pistons, Cylinders, Crankshafts, Valves
 - **Session 6:** Timing Systems and Camshafts
 - **Session 7:** Fuel Injection and Air Intake Systems
 - **Session 8:** Compression, Power, Exhaust Phases Analysis
- ◆ **Week 3: Common Engine Faults & Their Causes**
 - **Session 9:** Engine Overheating and Loss of Compression
 - **Session 10:** Oil Leaks, Misfires, Smoke Types
 - **Session 11:** Fuel System Problems
 - **Session 12:** Sound and Vibration-Based Diagnosis
- ◆ **Week 4: Diagnostic Tools and Techniques**
 - **Session 13:** Using Multimeters and Compression Testers
 - **Session 14:** Interpreting Error Codes (OBD, Manual Reading)
 - **Session 15:** Engine Analyzer Tools & Sensors
 - **Session 16:** Practical Diagnostic Exercises
- ◆ **Week 5: Electrical & Cooling Systems**
 - **Session 17:** Starter Motors and Alternators
 - **Session 18:** Battery Testing and Wiring Inspection
 - **Session 19:** Cooling System Components (Radiators, Pumps, Thermostats)
 - **Session 20:** Testing for Coolant Flow and Blockages
- ◆ **Week 6: Lubrication System & Final Repairs**
 - **Session 21:** Oil Pump, Filters, and Lubrication Paths

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- **Session 22:** Oil Quality Testing and Filter Changes
- **Session 23:** Full Disassembly and Assembly Workshop
- **Session 24:** Final Engine Test & Assessment

Learning Outcomes

By the end of the course, participants will:

- ✓ Confidently identify engine parts and their functions.
- ✓ Perform full diagnostics using both **traditional and digital tools**.
- ✓ Repair engine issues related to **combustion, cooling, and lubrication**.
- ✓ Document faults, service procedures, and maintain logs.
- ✓ Apply **safe work practices** in engine maintenance settings.

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