

## SYLLABUS

### ITI Motor Mechanic Syllabus (2-Year Programme)

#### First Year

#### 1. Trade Theory

##### Unit 1: Safety and Environment

- Introduction to safety, health, and environment guidelines
- Fire safety and first aid
- Workshop safety rules, use of safety equipment, and emergency procedures

##### Unit 2: Basics of Automobiles

- Overview of automobile industry
- Types of vehicles
- Introduction to major systems and components

##### Unit 3: Engine Fundamentals

- Working principles of engines
- Types and classifications of engines
- Engine cycles (2-stroke and 4-stroke)
- Combustion process

##### Unit 4: Fuel Systems

- Different types of fuel systems (carburetor and fuel injection)
- Fuel pumps and filters
- Types of fuels

##### Unit 5: Lubrication Systems

- Functions of lubrication systems
- Types and working principles
- Lubricants and maintenance

##### Unit 6: Cooling Systems

- Types of cooling systems (air-cooled and water-cooled)
- Components and maintenance

### **Unit 7: Transmission Systems**

- Clutches, gearboxes, differentials, and propeller shafts
- Types and working principles

### **Unit 8: Electrical Systems**

- Basic electrical principles
- Battery, starting system, charging system, and ignition system
- Wiring diagrams

### **Unit 9: Braking Systems**

- Types of brakes (drum and disc)
- Hydraulic and mechanical brakes
- Brake components and maintenance

### **Unit 10: Steering and Suspension Systems**

- Types of steering systems (manual and power)
- Suspension systems
- Wheel alignment and balancing

### **Unit 11: Automobile Maintenance**

- Types of maintenance (preventive and corrective)
- Service schedules and common maintenance tasks

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## **2. Workshop Calculation and Science**

### **Unit 1: Basic Workshop Calculation and Science**

- Units and measurements
- Area and volume of geometrical shapes
- Concepts of speed, velocity, and acceleration
- Force, pressure, work, and energy
- Temperature scales, heat transfer methods, and thermodynamics basics

## **3. Engineering Drawing**

### **Unit 1: Basic Engineering Drawing**

- Types of lines, dimensions, and scale
- Orthographic projections: Projection methods and views
- Isometric drawing: Isometric views and techniques
- Symbols and conventions: Standard symbols for electrical and mechanical components

## **4. Practical Training**

### **Unit 1: Basic Practical Training**

- Engine dismantling and assembly
- Component testing and troubleshooting
- Routine maintenance tasks (oil changes, filter replacements, brake inspections)
- Hands-on practice with fuel, lubrication, cooling, transmission, braking, steering, and suspension systems

## **Second Year**

### **1. Advanced Trade Theory**

#### **Unit 1: Advanced Engine Tuning and Diagnosis**

- Advanced techniques for engine tuning
- Engine diagnostics and troubleshooting

#### **Unit 2: Emission Control Systems**

- Types of emission control systems
- Components and regulations

#### **Unit 3: Advanced Fuel Systems**

- Electronic fuel injection systems
- Direct injection and common rail systems

#### **Unit 4: Advanced Electrical Systems**

- Electronic control units (ECUs)
- Sensors, actuators, and diagnostics

#### **Unit 5: Hybrid and Electric Vehicles**

- Basics of hybrid and electric vehicle technology
- Components and safety procedures

#### **Unit 6: Vehicle Dynamics**

- Principles of vehicle dynamics
- Handling and stability

#### **Unit 7: Advanced Transmission Systems**

- Automatic transmission
- Continuously Variable Transmission (CVT) and Direct-Shift Gearbox (DSG)

#### **Unit 8: Hydraulic and Pneumatic Systems**

- Basic principles of hydraulic and pneumatic systems
- Components and applications in automobiles

## **2. Advanced Workshop Calculation and Science**

### **Unit 1: Advanced Workshop Calculation and Science**

- Advanced measurements and precision instruments
- Strength of materials: Basic concepts of material strength, stress, and strain
- Fluid mechanics: Basics and applications in hydraulics
- Advanced concepts of thermodynamics and heat engines

## **3. Advanced Engineering Drawing**

### **Unit 1: Advanced Engineering Drawing**

- Complex component drawings and assembly drawings
- Electrical and hydraulic schematics: Reading and interpreting

## **4. Advanced Practical Training**

### **Unit 1: Advanced Practical Training**

- Advanced engine diagnostics: Use of diagnostic tools and software
- Emission testing: Procedures and compliance
- Hybrid and electric vehicle maintenance: Safety procedures and maintenance
- Advanced system repair: Automatic transmissions and electronic controls
- Real-world projects: Diagnosis, repair, and maintenance of vehicles

