

Doc 4.3. Example of a Training Plan/Module

Auto Mechanic (Petrol) - 312 Hrs (60 days)

Objective

This course will impart on the trainees working knowledge of how gasoline vehicles are assembled to enable them to carry out minor and major repairs on the engines.

At the end of the training, the trainees would be able to:

- Use cutting tools efficiently and effectively (hacksaw, files, drills etc)
- Use measuring / hand tools effectively and accurately.
- Disassemble and assemble the assemblies/sub assemblies of a gasoline vehicle.
- Explain the operations of the systems in the engine.
- Enumerate the basic scientific principles applied in the trade.
- Discuss the circuit's diagram of ignition system and its principles.
- Explain what the power transmission system is about
- Work on the suspension and steering system.
- Work on the brake system.
- Tune the gasoline vehicle efficiently.

Emphasis will be given on character building of trainees during their training by including ideas on patriotism, discipline and work ethics in the different sessions that would enable them to deal with their clients in an appropriate manner.

Training Schedule

Following are the details of the course schedule:

Total training hours	=	312 hours
Days in a week	=	6 days
Total training days	=	52 days

This course on Auto Mechanic (Petrol) focuses on the teaching of theoretical and practical skills, wherein eighty percent (80%) of the time will be spent on practical skills development while twenty percent (20%) for theoretical inputs.

Requirements for Admission:

Education

To be admitted to the Auto Mechanic (Petrol) Course the aspiring trainee must have completed Middle School, possess a good understanding of arithmetic, and ability to read and write fairly well.

Languages

Fully understands (reading, writing and listening) the National Language (Urdu) and Local languages in addition to some basic level of understanding the English language.

Proficiency Level

Knowledge

To become an Auto Mechanic (Petrol) the trainee is expected to have a good understanding of the following concepts after completion of the course:

- Basic mathematics to help them take measurements
- Measuring and hand tools (vernier caliper, Micro-meter, dial indicator, torque wrench, open end spanner, ring spanner, spanner, screw driver, compression gauge, vacuum gauge etc.)
- Correct use of tools / equipment in the shop
- Basic technical drawing of vehicle assemblies & sub assemblies
- Operation of internal combustion engine
- Types and construction of an engine
- Specifications of various parts of engine
- Various systems of an engine, i.e. Fuel injection, lubrication, cooling and exhaust system
- Turbo and super chargers
- Functions of power train
- Functions of the suspension system
- Functions of Steering system
- Functions of brake system
- Wheels and tires

2

Skills

It is expected that after completion of the Auto Mechanic (Petrol) Course, the participants will have the following skills:

- Using measuring instruments/ hand tools accurately / efficiently.
- Using cutting tools efficiently (hacksaw, files and drills etc.)
- Disassembling and assembling the engine into sub-assemblies.
- Disassembling and assembling the cylinder head and take its measurements.
- Disassembling and assembling the camshaft, rocker arm and valve mechanism.
- Disassembling and assembling the connecting rod, piston, piston rings and taking their measurements including cylinder bore.

- Disassembling and assembling the oil pressure pump and carrying out inspection of the system.
- Disassembling and assembling the cooling system, i.e. radiator, water pump thermostat etc.
- Disassembling and assembling the fuel system.
- Checking the circuit's diagram of the ignition system.
- Removing and re-fixing the clutch plates and making adjustments.
- Inspect and maintain the power train (gear box, propeller shaft and differential).
- Removing and re-fixing the brake system parts, i.e. master cylinder, wheel cylinder brake shoes and brake drum disc.
- Removing and refitting the parts of the suspension system.
- Removing and refitting the parts of steering system (linkages and assemblies).
- Tuning of a petrol engine with special emphasis on the following:
 - Diagnosing the troubles, and applying remedies.
 - Inspecting and adjusting the carburetor.
 - Maintaining safety areas periodically

Job opportunities

After completing the course, the trainee will be competent in doing the work of an Auto Mechanic (Petrol). It would open opportunities for the trainee to gain a new employment or maintain present employment auto mechanic (Petrol). The course will enable them to engage in a fulfilling work of an auto mechanic (Petrol).

The trained auto mechanic (Petrol) will be able to work as a skilled worker in the following positions / technical areas.

- Self-employment (workshops, service stations etc.)
- Authorized sales representatives / service dealers.
- Auto parts manufacturing industries, vendors etc.
- Private workshops.
- Car manufacturers having large transport fleet.
- Petrol pumps/service stations.
- Compressor maintenance shops

Training Methodology

Different training techniques will be used during the training taking into consideration various adult learning principles. Below are some of the major training techniques that will be utilized:

- Theoretical Sessions- interactive lectures
- Brainstorming
- Small Group Activity
- Presentation
- Quiz
- Sharing Guided Experience
- Practical work
- Assignments

Course Description and Duration

Theoretical: 62 hours

1. Basic Knowledge (10 Hrs)

- Basic units / derived units (force, work done, torque, power, density)
- Introduction to hand tools and their use
- Measuring instruments and their use
- Safety precautions/maintenance of workshop & equipments

2. Bench Work (12 Hrs)

- Filing & Fitting
- Grinding
- Drilling
- Sawing

3. Engine (15 Hrs)

- Define internal combustion engine.
- Application of internal combustion engine
- Working principle of 4 & 2 stroke engine
- Engine construction
- Cooling system
- Lubricating system
- Ignition system
- Carburetor systems
- EFI systems
- CNG systems
- Exhaust system.

- Engine tuning / troubleshooting and engine testing.

4. Power Train (12 Hrs)

- Clutch
- Gearbox
- Propeller shaft
- Differential
- Final drive, wheel and tires

5. Suspension, steering & Brakes (13 Hrs)

- Shock absorber / coil spring / leaf spring.
- Suspension elements
- Simple steering system
- Power assisted steering system.
- Mechanical brake
- Pascal law
- Hydraulic brake
- Master cylinder
- Power assisted brake.

Practical: 250 hours

1. Basic knowledge (20Hrs)

- Introduction to hand tools and their use (Open-end spanners, ring end spanners, sockets, pullers, plier, hacksaw etc)
- Introduction to measuring instruments and their use (Vernier caliper, Micrometer, Dial gauge, Feeler gauge, Multi-meter, etc)

2. Bench Work (25 Hrs)

- Filing work
- Grinding work
- Sawing work
- Drilling work

3. Engine (30 Hrs)

- Cylinder blocks inspection, measurement of cylinders out of roundness & taper ness.
- Cylinder head inspection, measurement of cylinders head warp-page
- Replacing a cylinder head gasket
- Tightening and loosening cylinder head bolts to proper torque by using service manual.

- Removing, replacing the engine valves.
- Prefacing valves and valve seats
- Valve tappet adjustments
- Piston and piston rings inspection & installation of compression & oil rings
- Fitting of piston pins
- Installing main bearing and connecting rod bearing inserts.
- Replacing a timing belt
- Setting the ignition timing
- Reverse flushing of cooling system.
- Checking serviceability of radiator, thermostat valve and pressure cap
- Changing engine oil
- Change oil pan gasket.
- Engine lubrication points
- Exhaust system servicing like replacement of silencer.
- Engine disassembling and reassembling practice

4. Fuel System (25 Hrs)

- Servicing and overhauling and adjustments of a simple fixed venture, two barrel carburetor
- Servicing & overhauling of mechanical and electrical fuel (gasoline) pump.
- Familiarization of different components of electronic fuel injection system, like sensors, electronic control units (ECU), injectors, electronic type distributor, etc
- Practice of manual decoding of stored diagnostic codes.
- Engine tuning and troubleshooting of carburetor equipped engine. The troubles include such as (engine missing, engine overheating, excessive oil and fuel consumption, engine dieseling, poor acceleration, hard starting).

5. Power Train.(25 Hrs)

- Removing and replacing and adjustments of clutch
- Dismantling inspection and servicing of 4-speed manual gearbox.
- Removing and refitting of universal joints.
- Servicing and adjustment of differential

6. Suspension, steering & brakes (25 Hrs)

- Macpherson strut type suspension, removing and refitting.
- Shock absorber disassembling, assembling and inspection
- Removing, servicing and refitting of rack and pinion type steering.
- Servicing ball joints and linkages

- Wheel balancing
- Wheel alignment
- Adjustment of brake paddle paly
- Maintenance & repair of master and wheel cylinder
- Brake bleeding.
- Servicing of power assisted brakes.
- Adjustment of brake shoes

7. Engine testing & measurement (25 Hrs)

- Engine compression and vacuum testing
- Engine leakage testing
- Exhaust emission testing using CO tester.
- Measuring engine RPM, dwell angle, ignition timing, and using engine analyzer.

8. Servicing & workshop Environment (25 Hrs)

- Car servicing and greasing
- Acquaintance with workshop records (service manuals, job cards)

9. On the job training (25Hrs)

One week on job training at any recognized / standardized Industry / Organization / Workshop at the end of the session, on specific job.Tools / Machinery / Equipment, etc

Tools, machinery, equipment, etc.

Sr. No.	Nomenclature of Equipment / Tools	Quantity
1.	Open end spanner set (6-32 mm)	05
2.	Ring end spanner set (6-32 mm)	05
3.	Allen key set socket set (1.5-10mm)	05
4.	Socket set (8-32 mm)	05
5.	Torque Wrench (Wretches type) (10-500N)	02
6.	Adjustable wrench (1')	05
7.	Oil filter wrench	05
8.	Flat screw driver (blade length)	05 each
9.	Philips screw driver blade length (4',6',8',12')	05 each
10.	Lock Plier (8')	05
11.	Nose Plier (8')	05
12.	Vice grip plier (8")	05

13.	Combination slip plier (8')	05
14.	Brake spring plier (8')	05
15.	File with handle (flat size) (150 to 300 mm)	20
16.	File with handle (bastered) (150 to 300 mm)	20
17.	File with handle (froud n) (150 to 300 mm)	20
18.	File with handle (square)(150 to 300 mm)	20
19.	Scraper	05
20.	Ball peen hammers (1Kg.)	03
21.	Rubber Hammer	03
22.	Hand Hacksaw frame (300mm)	20
23.	Steel ruler (30cm)	05
24.	Steel tape (50 inch)	05
25.	Piston ring compressor (3 mm)	05
26.	Valve compressor	05
27.	C-clamp	05
28.	Bearing puller	05
29.	Tire puller	03
30.	V-block	10
31.	Hydraulic floor jack (2ton)	02
32.	Adjustable jack stands.	04
33.	Service creeper	02
34.	Bench vice (4')	20
35.	Work Bench, steel (6'x21/2'x23/4')	05
36.	S.S.T. Board	05
37.	Tool Box (empty)	05
38.	Jumper cables	02 set
39.	Parts tray (12'x10')	05
40.	Vernier caliper (150mm)	20
41.	Vernier height gauge (24')	02
42.	Out side micrometer (0-1,1-3,0-100mm)	05 each
43.	Inside micrometer	05
44.	Dial indicator (with magnetic base stand)(0.001 inch)	05

45.	Feeler gauge (0.05-1.00mm)	05
46.	Screw pitch gauge	05
47.	Tire pressure gauge (dial type) (200 psi)	05
48.	Digital Multi-meter	05
49.	Ignition timing light	10
50.	Bench grinder (8')	03
51.	Drill press machine (fixed)	02
52.	Portable power drill machine wheel balancer	02
53.	Optical 4 wheel alignment air compressor	01
54.	Model of 4 stroke petrol engine	01
55.	Petrol engine Toyota 1300 cc	01
56.	Honda 1600 cc EFI system	01
57.	Suzuki 800cc	01
58.	Honda 125cc (Motorcycle)	01
59.	Petrol engine vehicle Toyota Corolla	01

Business Management Skills Training

An essential part of the training package is four day business management skill training. The objective is to orient the participants on business management and enable them to engage in entrepreneurship. The main contents of this component are as follows:

- Business Management Skills Training - Basic Concepts of Entrepreneurship
- How to start a small business - Preparing a Business Plan
- Managing a Business
- Business / enterprise successes and failures
- Lessons learned from the first year of business implementation
- Stages of small business
- What's Important at initial stage?
- Will your business make money?
- Marketing and product development
- Financial and technical appraisal of each project
- Accounting and Financial management

Selection Criteria

The short listed candidates are then further screened by the Social Mobilizers using the following indicators: literacy, language proficiency, household income, dependency ratio, family size, profession of other household members, permanency, infrastructure arrangements of household, poverty level, prior efforts, future plan and why, resources required, and a guarantor who will recommend the trainee and vouch for his/her economic status and seriousness of intention, identify prevailing marketing trends and opportunities, confirm availability of employment, etc.

Hostel

Hostel facility is available to the trainees, both male and female. Some rooms can accommodate two persons while some can accommodate as many as three. The following amenities are likewise available:

- Breakfast
- Lunch
- Dinner
- Iron
- Newspaper
- Common room
- Mosque
- Bathrooms
- Water (warm water in winter)

Following are the rules and regulations for all hostel residents:

- No smoking in the rooms. Smoke only at designated places- for Trainees who are 18 years old and above.
- Criminal offences such as:
- Consumption of illegal drugs;
- Substance abuse;
- Underage smoking;
- Theft/stealing;
- Vandalism/destruction of public property;
- Littering;
- Gambling;
- Unlawful assembly or gathering for the purpose of committing an illegal act;
- fighting;
- Any other forms of criminal act or behavior not stated here will be reported
- to the police. Offenders will be handed over to the concerned authorities.

- No visitor allowed after 08:00 pm. Visitors must register at security counter upon arrival and departure. Visitor must at all times remain in common areas and not be allowed into any bedrooms.
- Residents shall not create or permit their guests or visitors to create any disturbance or nuisance in the hostel that will interfere with the well being of others.
- All residents shall be considerate towards other residents in the compound at all times
- No cooking in the room
- Lights and fans to be switched off when no one is in the room
- Duplication of keys is prohibited and unauthorized entry to a room is a serious offence.

Reading Materials

According to the need and requirements of the course, the Institute shall provide training and reading materials to the trainees during the training, such as

- Subject related books
- Photocopies of class notes
- Handouts

Stationery

Stationery will be provided to all trainees as well during the training, which includes copies, pencils, pen, files, drawing sheets, practical copies, etc. depending on the needs and requirements of the training course.

Certification

The following Institutes are certifying our training courses

- Technical and Vocational Training Authority-TEVTA
- National Staff Training Institute, Islamabad
- National Institute of Science and Technical Education
- Skill Development Council, Islamabad