INTRODUCTION TO ORGANIZATION

- The founder of this organization is Mr. Sheetalbhai. He started only car wash and service in 2012. Then he started mechanical work and wheel alignment & wheel balancing in 2014.

- Shree Automotive Motors works with many types of company cars like Hyundai, Honda, Maruti Suzuki, Toyota, Tata, Mahindra, Ford, Nissan, etc.

- There are three parts in working this organization:
  - Car washing department
  - Wheel alignment & balancing department
  - Mechanical work department

- The automotive motors is collaboration by Express Car Wash Organization five years ago.
Coming car in workshop

Coming car in shree automotive motors are most of company. There car are alto, sentro, i10, i20, accent, wegenar, maruti 800, vento, indica, eco, figo, feasta, bollero, scorpio, honda city, verito, etc.

- Maruti Suzuki
- Ford
- Honda
- Tata
- Hyundai
- Toyota
- Mahindra
- Nissan
- Wokswagen
Industry layout

Layout of shree automotive is shown in Fig.
2.2 Modern Layout

[Diagram showing a layout with labels]

- Parking
- Alingment & Balancing
- Washing Department
- Office
- Fresh room
- Store room
- Service Department
Chapter:- 3

❖ Hierarchy Of Industry
Chapter 4

❖ Instruments & Equipments Use in Workshop

4.1 power tools

4.1.1 Tyre changer
4.1.2 Wheel alignment machine
4.1.3 Wheel balancing machine
4.1.4 Nitrogen filling machine
4.1.5 Battery charger
4.1.6 Battery tester
4.1.7 A/C gas recharge/recover/recycle machine
4.1.8 Petrol /Diesel injector cleaning and testing machine
4.1.9 Pneumatic gun
4.1.10 Electric portable drill

4.2: Hand tools

4.2.1 Hammer
4.2.2 Wrench
4.2.3 Dent puller
4.2.4 File
4.2.5 Oil wrench
4.2.6 Spanner
4.2.7 Ratchet
4.2.8 Filler gauge
4.3 Special tools

4.3.1 Millimeter

4.1: Power tools:

Power tools are increasingly used in modern automated auto workshop. They are operated by pneumatic, electricity and hydraulics powers. Their use envisages quicker, effortless and efficient service.

Although a large number of power tools are in use, however, only main among them will be described briefly as follow

4.1.1: Tyre changer

Figure-4.1 Tyre Changer machine
- Tyre changer machine is used for changing tyre & rim.

→ **Specification:-**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer clamping diameter range</td>
<td>10”-24”</td>
</tr>
<tr>
<td>Inner clamping diameter</td>
<td>12”-24”</td>
</tr>
<tr>
<td>Maximum outer tire diameter</td>
<td>40”</td>
</tr>
<tr>
<td>Maximum wheel width</td>
<td>12”</td>
</tr>
<tr>
<td>Compressed air supply</td>
<td>110-170 PSI</td>
</tr>
<tr>
<td>Bead breaker power</td>
<td>3,400 lbs.</td>
</tr>
<tr>
<td>Power requirements</td>
<td>120v 1Ph 12A 60Hz</td>
</tr>
</tbody>
</table>

Table-1 Specification of Tyre changer

4.1.2 Wheel alignment machine:-

- Camber and caster can be adjusted by the alignment machine.
- For four vehicles camber-caster and toe-in/toe-out can be also adjusted by alignment machine.
• Necessity of alignment is that car is pulling right or left side at up to 60 km/hour.

**Table-2 Specification of Alignment Machine**

<table>
<thead>
<tr>
<th>Application</th>
<th>Preferred</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camber(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>0</td>
<td>-1 to 1</td>
</tr>
<tr>
<td>Rear</td>
<td>-1.3</td>
<td>-1.5 to -0.5</td>
</tr>
<tr>
<td>Caster (1)</td>
<td>3.33</td>
<td>2.33 to 4.33</td>
</tr>
<tr>
<td>Toe-in (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>.16</td>
<td>0.11 to 0.21</td>
</tr>
<tr>
<td>Rear</td>
<td>.03</td>
<td>-0.5 to 0.12</td>
</tr>
<tr>
<td>Toe-in (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>0.33</td>
<td>0.23 to 0.43</td>
</tr>
<tr>
<td>Rear</td>
<td>0.07</td>
<td>-0.10 to 0.23</td>
</tr>
</tbody>
</table>

(1) Measurement in degree
(2) Measurement in inch

**Table-1 specification of Tyre changer**
4.1.3: Wheel balancing machine:

- Due to jerking and vibration on steering at 60-80 km/hr speed it is sign that wheel unbalanced.
- Wheel unbalanced done because of uneven distribution of the weight around the axis of rotation.
- Install the tyre on the balancer machine and adjust the balance until it indicates 0 grams.
- Perform the inspection for the opposite side in the same way.

→ Specification:

<table>
<thead>
<tr>
<th>Table-3 specification of wheel balancing machine</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Wheel &amp; Tire assembly Weight</td>
<td>154 lbs</td>
</tr>
<tr>
<td>Maximum Wheel &amp; Tire assembly diameter</td>
<td>44&quot;</td>
</tr>
<tr>
<td>Maximum Wheel &amp; Tire assembly width</td>
<td>21&quot;</td>
</tr>
<tr>
<td>Wheel diameter range</td>
<td>8”-30”</td>
</tr>
<tr>
<td>Balancer Shaft Diameter</td>
<td>40mm</td>
</tr>
<tr>
<td>Balancing Accuracy</td>
<td>0.05oz</td>
</tr>
<tr>
<td>Measuring Speed</td>
<td>200 rpm</td>
</tr>
<tr>
<td>Weight Storage Pockets</td>
<td>17</td>
</tr>
<tr>
<td>------------------------</td>
<td>----</td>
</tr>
<tr>
<td>Dimension (D<em>H</em>L)</td>
<td>48.5”/51”/54”</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>230V 1Ph 4A 60Hz</td>
</tr>
</tbody>
</table>

**Table-3 specification of wheel balancing machine**

4.1.4:- N$_2$ filling gas machine:-

- To fills nitrogen in tire.
- By this machine we can also remove nitrogen.
- We can also fill air in tyre by using this machine.

![Figure-4.4 N$_2$ filling gas machine](image)
4.1.5:- Battery Charger:-

When a battery is discharged and its not capable of delivery any current, it may be discharged.

This is done by supplying it with a flow of current from some external source, such as a battery charger, which forces through the battery in a reverse direction. Thus, the plates, are restored its original composition and battery becomes recharged.
4.1.6 :- Battery Tester:-

Figure-4.6 Battery Tester

- By using this tester we can know that battery is charged or not, battery water gravity, require to replace or not, voltage.
- This machine gives precise reading. And its accuracy is excellent.

4.1.7 recharge machine:-

Figure-4.7 A/C recharge machine
This machine used for recharge refrigerant in a/c system in vehicles.

- R_{134A} gas is used in a/c system because this gas is do not harmful for environment.
- By using this machine we can top-up accurate quantity of refrigerant in a/c system.

### 4.1.8 Injector cleaning & testing machine

**Figure-4.8 Injector cleaning & testing machine**

- Cleans injectors of all MPFI vehicles.
- Pulse flow & injector leak also test.

→ **Specification:**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of injector cleaned &amp; tested</td>
<td>Up to 4 injectors cleaned and tested</td>
</tr>
<tr>
<td></td>
<td>simultaneously</td>
</tr>
<tr>
<td>Power require</td>
<td>230v AC or 12v DC</td>
</tr>
<tr>
<td>Type of injectors clean and test</td>
<td>All types of injectors</td>
</tr>
</tbody>
</table>

**Table-4 Specification of Injector cleaning & testing Machine**
4.1.9 Pneumatic gun

- Pneumatic gun is also known as impact wrench, air wrench, rattle gun, torque gun.
- Pneumatic gun are widely used in many industries, such as automotive repair, heavy equipment maintenance and any other instance where a high torque output is needed.
- It gun is tightens and loosen the nuts and bolts in a short time. This is portable machine.
- For precise work this gun is very helpful for technicians.
4.1.10 portable drilling machine

- This is an electrically powered machine which is used to make holes wherever required.
- It can be taken conveniently to any area of repair, since it is handy, compact and portable.

→ **Specification:**

<table>
<thead>
<tr>
<th>Specification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck size</td>
<td>6mm</td>
</tr>
<tr>
<td>Power input</td>
<td>500 watt</td>
</tr>
<tr>
<td>No load speed</td>
<td>2800 rpm</td>
</tr>
<tr>
<td>Weight</td>
<td>Approximately 5 kg</td>
</tr>
</tbody>
</table>

*Table-5 Specification of Portable Drilling Machine*
4.2 Hand tools.

Choose the right tool for the job otherwise you could damage the part you are working on the tool or yourself.

4.2.1 Hammer

- Figure 4.11 Hammer
  - Hammer is man’s primitive tool.
  - In hammer metal head is used for striking.

4.2.2 Wrench

- Figure 4.12 Pipe Wrench
With the greater application of machinery, the variety of wrenches in daily use has also increased.

The traditional open end wrench, pipe wrenches and monkey wrenches have been replaced by those which are generally made of chrome-molybdenum or chrome-vanadium steel.

4.2.3 Dent puller

To remove minor dents we can use dent puller.

Dent puller also known as sliding hammer.

The slide hammer can completely repair a dent when used in conjunction with a few other materials, including body filler and primer.
4.2.4 File

- File is one of the most important tools in body repairing shop.
- It is used for filing surfaces or make a smoothness.

4.2.5 Oil wrench.
- An Oil filter wrench is a tool for removing spin-on type oil filters.
- A common type of wrench utilizes a metal or plastic cup that is shaped much like a socket.
- The cup is placed on the end of the filter, which engages the knurling. A socket or wrench is then used to loosen or tighten the filter.

4.2.6 spanners.

![Figure-4.16 Spanners](image)

- There are many types of spanners.
- The most common are open end spanner, ring spanner, and the combination spanners.
- Spanner will only do a job properly if it’s the right size for the nut or the bolt to be turned.
4.2.7 Ratchet.

- The most prevalent form is the ratcheting socket wrench, often called a ratchet.
- By using sockets and ratchet we can tighten and loosen nuts and bolts.

4.2.8 Filler gauge.
- A feeler gauge is used to measure gap width.
- Feeler gauges are mostly used in engineering to measure the clearance between two parts.
- They consist of different thickness with measurements marked on each piece.

4.3 Special tool

4.3.1 multi meter.

![Multi-meter](image)

**Figure-4.19 Multi-meter**

- Multi meter is use for measure voltage, current, and resistance.
Chapter 5.

Practical Experience In Industry

5.1 Procedure of service department:

- When customer comes at workshop adviser fill up job card.
- In job card adviser write which type of service customer want.
- If any other problems with car then adviser write down in job card.
- Adviser check the car there are any damages or not.
- After complete job card procedure adviser give job card to the job controller.
- Job controller read job card in detail. After reading job card he gives job card to quality controller if test drive required then he take test ride to see customer complain.
- After he give job card to technician for complete service.
- After complete service quality controller take test drive again to see customer’s problem solved or not.
- After complete all these procedure technician put car for washing, cleaning and vacuum.
- After washing adviser call customer to take car.

Which type of services I learned?

5.2 Changing oil, oil filter:

Why should engine oil required to replace?

- Engines have many moving parts. As these parts move and rub against each other, the force of friction creates heat.
- Oil lubricates the engine and absorbs heat, allowing the internal parts to work together effectively without overheating.
- Engine oil also keeps engine clean by removing carbon.

When engine oil required replacing?

- Change engine oil as per automobile manufacturers might suggest.
- Generally mechanic recommends you change engine oil after every 5000 km.
Automobile manufacturers might suggest a longer interval, such as 8000 to 10000 km.

→ **Procedure:**

- Remove the drain bolt and washer which is indicating in fig.
- Drain the oil in appropriate container.
- With the help of oil wrench remove oil filter and let the remaining oil drain. (Check the oil filter to make sure it’s gasket did not stick to the engine block. A stuck gasket could cause an oil leak.)
- Install new filter with the help of oil wrench.
- Now put the new washer on the drain bolt, then reinstall drain bolt.
- Now refill the engine oil with help of recommended oil.
- Engine oil change capacity in Brio, City, Jazz, Amaze: 3.2l to 3.5l
- Reinstall the engine oil fill cap. Start the engine.
- After 2 or 3 minutes switch off ignition and measure oil level by using gauge.

*Figure-5.1 Location of Oil Drain bolt & oil filter*
5.3 Replace air cleaner:

Figure 5.2 Air Cleaner Element

- Air filters clean air which is entering in engine.
- In service we clean air filter element.
- After 20,000km manufacturer recommend to replace air filter element.
- If you not replace it time to time it may affect on your engine's life and engine performance.

5.4 brake service

* What is brake service?

- In brake service first of all top-up brake oil if necessary.
- After check brake pads, disc, caliper.
- Brake pedal working.

→ Procedure:

- Remove tyre.
- Now unscrewed caliper and check it.
- After removing caliper you can easily remove brake pads. Remove them and check it. If brake pads thickness too thin it means brake pads require to replace.
• If brake pads in good condition then polish it by use with polish paper.
• Now check brake disc. Check its surface and edge both. If it’s damage then replace it.

5.4 valve clearance setting
The valve tappet clearance is adjusting screw provided on the valve tappet.
If your valve clearance is not proper then it causes decrease pick-up and average.
Loose tappet may make noise.
If you tight tappet then it may damage valve.
So proper tappet setting most important.
Valve clearance is measured by filler gauge.

5.5 throttle body changing

Figure-5.5 Throttle Body

Throttle body mix air and fuel before entering in cylinder.
Throttle body consist butterfly valve.
The reason of cleaning of throttle body is that carbon frozen in body.
Throttle body is important for pick –up if you not clean throttle body as per manufacturer recommended then your car’s pick-up decrease.
Remove air cleaner filter housing.
Unscrew bolt of throttle body and clean it.
Use chock cleaner spray for cleaning throttle body.
5.6 Radiator and condenser replace

→ **Radiator:**
  - A radiator is an important part of a car’s cooling system.
  - It passes hot coolant through metal fins that conduct heat away from the liquid and into the air.
  - It passes hot coolant through metal fins that conduct heat away from the liquid and into the air.
  - When the coolant has reached the correct temperature, it is pumped back into the engine block.

→ **Condenser:**
  - Condenser is one of the most important part of A/C system.
  - Condenser exchange heat.
  - It is what cools your refrigerant gas (R-135a) down from a hot gas leaving the compressor back into a cool liquid that the rest of the system needs to keep you cool in hot days.

→ **Procedure:**
  - First remove bumper and head light.
  - After it recover A/C gas.
  - Now drain coolant in appropriate container.
  - After that unscrewed condenser first and remove it.
  - After that unscrewed radiator.
  - Detach upper and lower radiator hoses let the remaining coolant drain.
  - Now detach fan assembly socket and remove radiator.

5.7 fuel pump

![Figure-5.6 Fuel Pump](image)
- Fuel pump is one of the most important parts of fuel injection system.
- Fuel pump delivers fuel to the fuel filter with pressure, and then from fuel filter the fuel is further passed to the common rail then to the injectors then to the combustion chamber.

5.7 Wheel balancing

- When you feel vibration on steering it is a sign for your wheel needed to balancing.
- Before checking the wheels for balance, it is necessary to inspect the wheel centering.
- After some rotation screen indicate needed weight.
- Then attach required weight on rim.
- Same procedure does another side of rim.
Chapter 6.

 Thumbnail Testing Of Automobiles

6.1 Testing in workshop

* How can we test vehicle in workshop?
  - When car comes in workshop quality controller take test ride.
  - Take test ride on smooth and rough road.
  - On rough road any unnecessary noise, vibration comes or not.
  - Alignment test: - car pulling any one side while driving at 50 to 60 km/hr speed on smooth road.
  - Steering vibration and jerking or not.
  - Gear shifting, clutch, brake, acceleration all proper work or not.
  - Battery test during service.
  - Injector test and cleaning. (injector test is only when customer complain about engine jerking, low pick up)

6.2 Vehicle check-up

* Road Test:
  1) Check of noise from engine compartment.
  2) Suspension noise.
  3) Noise for muffler and under body.
  4) Noise of rear area.
  5) Some problem of customer.
  6) Check dashboard and speedometer, fuel level gauge, other equipment.
  7) Check stirring system.
  8) Wheel bearing noise.
  9) Engine jerking.
 10)Engine knowing.
 11)Check backing system.
 12)Check accelerator pedal ply and clutch pedal ply.
 13)Check body penal noise.
 14)Check Air conditions system.
Chapter 7.

Engine & Gear Box Overhauls

7.1 Engine overhauls:-

* The troubles and repairs of engine parts can be divided into six following groups:

i. Cylinder head and cylinder block
ii. Valve mechanism-

![Figure-7.1 Valve Mechanism](image)

Valves, valve guide, cam shaft, rocker arm, push rods for over head valves, springs, seats and inserts

iii. Crankshaft assembly- crankshaft, main bearings, flywheel
iv. Connecting rod assembly- connecting rod, connecting rod bearing, piston and piston bearings, piston rings, cylinder wall.
v. Oil pan
vi. ignition system, cooling system,
**Procedure of engine overhauls:**

I describe you what I saw at workshop.

**Car:** city ZX

**Reason:** Because of under body impact, oil sump damage and engine overheat so that engine chock up.

- First of all lift the car by use of lift to see any other damage or not. After this start engine dissembling.
- Switch off ignition.
- For engine dissembling first of all collect all necessary tools and equipments handy.
- Disconnect the battery.
- Released all engine wiring harness. For safety wear hand gloves.
- Drain the oil and coolant.
- Remove bumper, headlights. If you can’t remove these it may be damage.
- Detach the upper and lower radiator hoses.
- Recover a/c gas by using a/c recover/recharge machine.
- Unscrewed radiator and condenser.
- Now remove radiator and condenser.
- Remove axle.
- There are three mounting joint. Loose the entire mounting bolt. Do not remove them otherwise engine may fall down and damage other parts and also may be injured by it.
- Now attach engine crane. And check it twice for safety.
- After check now unscrewed mounting.
- Now lift the engine by using engine crane.
- While you lifting engine, check also any wiring harness and other parts not joint with engine otherwise it may be damage.
Now remove valve cover. Remove igniters, spark plugs. After that unscrew engine head and remove it.
- Remove alternator, o₂ sensor, inlet manifold, exhaust manifold,
- Now with the help of equipment or helper inverse engine.
- Loose all bolt of oil sump.

---

Figure-7.2 Engine removing using by engine crane lift

Figure-7.3 Damaged oil sump
Due to less of oil engine overheat and it may be chock up.
Because of overheating crankshaft, connecting rod and piston may be burn and damaged.

Figure-7.4 Burned crank shaft

- Remove oil sump.
- Now unscrew crank shaft and connecting rod.
- Pull up piston from block.
- Check other parts engine block cylinder, piston, piston ring, connecting rod.
- Replace damage parts.
- Clean all pistons, piston rings.
- Now re-assemble engine in proper manner.
- After re-assemble top-up oil, replace oil filter, top-up coolant, and recharge a/c gas.
- Attach all wiring harness.
- Now start engine and check all the function.
Chapter 8

Major Vehicle Repair

8.1 Engine Jerking

- First of all we taken test drive in different speeds in different roads.
- We feel the jerking coming from engine.
- Then we lifted-up the car and check the under body of engine & transmission but, all found Ok.
- Engine oil & Coolant checked.
- Then we check the lights shown on dashboard which are also perfect.
- The fuel is also goes to the Common Rail.
- The diesel is also reached to the Injectors.

![Fig.8.1Engine jerking](image)

- We replace the ECM but, the problem was not solved.
- We replace the Filter Assembly but, then also problem was not solved.
- Then we replace the Common Rail with Pressure
- Then we service the EGR Valve, but still the problem remains same.
- The 2nd cylinder injector was frozen.
- Then we remove the Fuel tank & check the fuel quality.
8.2 Synchronizer ring change:

- Open the gear box
- Gear not shift 1\(^{st}\) & 2\(^{nd}\) gear
- Change 1\(^{st}\) & 2\(^{nd}\) synchronized ring & Change bearing
Fig.8.3 parts of gear box

8.3 Steering Rank replace

Fig 8.4 Steering rack replaces

**Steering Rack** Steering rack was not working and noise was coming from the rack. If steering rack is not repairable it needs to be replaced.
## Faults & Remedies Of Vehicle Repair

### 9.1 Faults and Remedies:

#### 9.1.1 Engine related faults:

<table>
<thead>
<tr>
<th>Fault</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Engine cranks at normal speed but does not start</td>
<td>o Make spark test</td>
</tr>
<tr>
<td></td>
<td>o Check timing and ignition system</td>
</tr>
<tr>
<td></td>
<td>o Check fuel pump, line, carburetor or fuel injection system</td>
</tr>
<tr>
<td>* Engine take too much time for starting after ignition switch on</td>
<td>o Set tappet</td>
</tr>
<tr>
<td></td>
<td>o Adjust valve clearance</td>
</tr>
<tr>
<td></td>
<td>o Test and clean spark plug</td>
</tr>
<tr>
<td></td>
<td>o Check ignition harness</td>
</tr>
<tr>
<td></td>
<td>o Set throttle positioning sensor</td>
</tr>
<tr>
<td>* Pick-up low</td>
<td>o clean air filter or replace if required</td>
</tr>
<tr>
<td></td>
<td>o service throttle body</td>
</tr>
<tr>
<td></td>
<td>o clean and test injector</td>
</tr>
<tr>
<td>* Engine over heat</td>
<td>o Check cylinder head if required to overhaul then overhaul cylinder head</td>
</tr>
<tr>
<td></td>
<td>o Check engine oil level and adjust it.</td>
</tr>
<tr>
<td></td>
<td>o Check coolant level in coolant reservoir if it is low then top up coolant. (Top-up only when engine temperature below 35 degree centigrade )</td>
</tr>
<tr>
<td>* Average low in technical language high fuel consumption</td>
<td>o Check fuel leakage from fuel line, fuel tank if there is leakage then repair or replace it.</td>
</tr>
<tr>
<td></td>
<td>o Clean air filter element or replace it.</td>
</tr>
<tr>
<td></td>
<td>o Test and clean spark plug or replace spark plug</td>
</tr>
<tr>
<td></td>
<td>o Adjust valve clearance as per prescribed.</td>
</tr>
</tbody>
</table>

Table-6 Engine related faults and remedies
### 9.1.2 Brake related faults and remedies:

<table>
<thead>
<tr>
<th>Faults</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Screeching noise comes from brake</td>
<td>o Check brake pads</td>
</tr>
<tr>
<td></td>
<td>o Check brake disc</td>
</tr>
<tr>
<td></td>
<td>o Check caliper</td>
</tr>
<tr>
<td></td>
<td>o Check caliper pin (Replace it if required).</td>
</tr>
<tr>
<td>* Brake sticking</td>
<td>o Check brake pads, disc, caliper (Replace it if required).</td>
</tr>
<tr>
<td></td>
<td>o Check brake pedal position.</td>
</tr>
<tr>
<td>* Brake work not properly</td>
<td>o Check Brake pads it may be appear too thin. Replace if it is too thin.</td>
</tr>
<tr>
<td></td>
<td>o Check Brake disc.</td>
</tr>
<tr>
<td></td>
<td>o Check brake caliper replace if damage.</td>
</tr>
<tr>
<td></td>
<td>o Check brake oil level if brake oil level low then top- up brake oil.</td>
</tr>
</tbody>
</table>

Table-7 Brake related faults and remedies

### 9.1.3 Clutch related faults and remedies:

<table>
<thead>
<tr>
<th>Faults</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Clutch pedal vibration and clutch slippage</td>
<td>o Required to clutch overhauls.</td>
</tr>
<tr>
<td></td>
<td>o Check friction plate replace if required.</td>
</tr>
<tr>
<td></td>
<td>o Check pressure plate replace if required.</td>
</tr>
<tr>
<td>* Noisy clutch</td>
<td>o Check clutch disc it may damage so replace if required.</td>
</tr>
<tr>
<td></td>
<td>o Friction plate may be damage replace if required.</td>
</tr>
<tr>
<td>* Hard clutch</td>
<td>o Replace</td>
</tr>
<tr>
<td>* Vibration on clutch pedal</td>
<td>o Check Pressure plate if damage then replace it.</td>
</tr>
<tr>
<td></td>
<td>o Friction plate damage (replace if required)</td>
</tr>
<tr>
<td></td>
<td>o Retighten pressure plate and fly wheel bolt as per prescribed torque.</td>
</tr>
</tbody>
</table>

Table-8 clutch related faults and remedies
### 9.1.4 Steering related faults and remedies:

<table>
<thead>
<tr>
<th>Faults</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Wobbling steering</td>
<td>o  Tight hub nuts.</td>
</tr>
<tr>
<td></td>
<td>o  Adjust tyre pressure.</td>
</tr>
<tr>
<td></td>
<td>o  Check tyre if bubble on tyre then replace it.</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Wobbling steering" /></td>
</tr>
<tr>
<td>* Steering feel hard</td>
<td>o  Check and adjust power steering oil.</td>
</tr>
<tr>
<td></td>
<td>o  Power steering pump work not properly replace if required.</td>
</tr>
<tr>
<td>* Vibration on steering</td>
<td>o  Required wheel balancing.</td>
</tr>
<tr>
<td></td>
<td>o  If steering bolt loose then tight it.</td>
</tr>
<tr>
<td></td>
<td>o  Tires inflated unequally so adjust it.</td>
</tr>
<tr>
<td>* Steering wheel pulling one side</td>
<td>o  Adjust alignment</td>
</tr>
<tr>
<td></td>
<td>o  Adjust tyre pressure</td>
</tr>
<tr>
<td></td>
<td>o  Worn or distorted link roads</td>
</tr>
<tr>
<td></td>
<td>o  Left or right side brake sticky</td>
</tr>
</tbody>
</table>

Table-9 Steering related faults and remedies

### 9.1.5 A/c system related faults and remedies:

<table>
<thead>
<tr>
<th>Faults</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>* A/c cooling low</td>
<td>o  Recharge A/c gas</td>
</tr>
<tr>
<td></td>
<td>o  Service A/C system</td>
</tr>
<tr>
<td></td>
<td>o  Check condenser if damage then replace</td>
</tr>
</tbody>
</table>

Table-10 A/C related faults and remedies
### 9.1.6 Wheel and tyre related faults and remedies:

<table>
<thead>
<tr>
<th>Faults</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Noise from tyre</td>
<td>o Wheel hub bearing replace</td>
</tr>
<tr>
<td>When ride on rough road</td>
<td>o Check wheel rim or replace if</td>
</tr>
<tr>
<td></td>
<td>damage.</td>
</tr>
</tbody>
</table>

Table-11 wheel and tyre related faults and remedies
Chapter 10.

❖ Maintenance & Preventive Maintenance Of Vehicles

10.1 Maintenance schedule:

➢ Free service is not available in organization
➢ Paid Service

1) Demand repair:-
   Providing service repair as per customer requirement and their demand.

2) Running repair :-
   • General check-up
   • Transmission system check-up
   • Suspension check-up
   • Braking system check-up and brake paid service
   • Engine work check-up and other engine noise check-up
   • Engine cooling system check-up
   • Wheel alignment
   • Wheel balancing

❖ Monsoon checkup

• Air Filter (Clean)
• Petrol Filter (Clean)
• Engine Oil Level (Check)
• Lights (Check)
• AC (Check)

10.2 General Service Sequel

1) Engine oil & oil filter
   • Every 10,000km/1 year
   • Synthetic oil – 1,00,000km

2) Engine coolant
   • Petrol-40,000km/2 year
3) Spark plug
- Diesel: 20,000km/2 year
- Euro4: 40,000km (As per required clean and replacement)

4) Fuel filter
- Petrol: 40,000km/2 year
- Diesel: 20,000km/2 year

5) Transmission oil
- Petrol/diesel: 40,000km/4 year (75w90)
- Synthetic: 1,60,000km/10 year (75w80)

6) Brake oil
- Petrol/diesel: 20,000km/2 year (as per required)

7) Water pump belts
- Petrol: 50,000km/3 year
- Diesel: 40,000km/2 year

8) Tapped set
- Petrol: 40,000km/4 year

9) Wheel balancing & wheel alignment
- Every 10,000km/1 year (as per require tyre rotation)

10) Air filter
- Petrol: 40,000km/2 year
- Diesel: 20,000km/2 year (as per require clean filter)

11) Brake pad
- Petrol: 40,000km/2 year
- Diesel: 20,000km/2 year

12) Injector
- Petrol - 40,000km/2 year
- Diesel – 20,000km/2 year (as per require clean, testing and replace)

13) Suspension

- Every 20,000km/1 year check suspension system.

14) Battery testing

- Petrol -20,000/2 year
- Diesel – 10,000/1 year

15) Engine mounting

- Petrol – 50,000/5 year
- Diesel -40,000/1 year

16) Wheel bearing

- Petrol – 60,000km/5 year
- Diesel – 50,000km/4 year

10.2.1 Honda Civic Automatic Transmission Maintenance schedule:

- Engine oil: every 10000 km
  Synthetic oil

- Oil filter: every 10000 km

- Air filter: after 20000 km

- Brake oil: after 20000 km

- Fuel filter: after 40000 km.
→ Spark plug: 100000 km.

→ Automatic transmission oil: 80000 km.

→ Drive belt: 100000 km.

→ Alignment: after 10000 km.

→ Wheel balancing: after 10000 km.

**10.2.2 Honda City Maintenance detail:**

→ Oil: 10000 km.

→ Oil filter: 10000 km.

→ Fuel filter: 20000 km.

→ Air cleaner element: 20000 km.

→ Brake & Clutch oil: 60000 km.

→ Transmission oil: 60000 km.

→ Spark plug: 100000 km.

→ Alignment: 10000 km.

→ Wheel balancing: 10000 km.
Chapter 11.

❖ Reconditioning Of Parts

- A reconditioning of parts is done because to reduce the actual cost.
- Reconditioning means not to change parts but, servicing of those parts and repairing.
- In our organization sometimes we, can’t repair a part but change that part. The following are the things that done in workshop for reconditioning of parts.

➢ Gear-Box:-

- Once, while gear-box over hauling, as the gear-box overhaul costs higher, the gear-box assembly/housing has a crack and leads to leak the oil.
- So for the cost reduction, we decide to weld the housing infect to replace it and as the housing costs high
- By the welding, the housing crack is fixed properly, and no leakage is found, these leads for cost-reduction.

➢ Brake Pads/Shoes:-

- Brake pads generally torn out but sometimes, because of the dust and removal of the pad material, they don’t work properly.
- So, in our workshop, first we check the pads, if they are in good condition, we don’t replace them and try to re-condition them.
- We rub the pads with glass-paper, and remove the dust and make them polish.
- From this process, the pads can work for long and perfectly.
- This can lead to cost reduction and the re-conditioning should be done.
Fig 11.1: Brake Pads

➢ **Bumper:-**

- Once, there was a car with the damaged bumper, after inspection, we decide to re-condition it infect to replace because new bumper costs high.
- One of the support hooks of the bumper was cracked and the material used for making bumpers is fiber for light-weight.
- So we decide to join the cracked hook with the help of glue and sand, glue for holding, and sand for making the holding tough.
- It worked and the bumper was assembled again and leads for cost reduction.

➢ **Spark Plugs:-**

- Very of the few times, Spark-Plugs can be re-conditioned.
- As the spark-plug can’t be serviced and comes with short life.
- But sometimes for cost reduction and customer satisfaction, we re-conditioned the spark-plugs.
- The major problem in spark-plug is the gap between the plug and the spark goes big, infect it should remain in contact to each other.
- So most times, spark-plugs get replaced, but it can be re-conditioned by creating the gap of proper measurement.
This process works some-times and leads for cost reduction.

Fig.11.2: Spark-Plug

➢ **Steering Rank/Assembly:**

- Steering Assembly costs high, so usually customer wants to service the steering assembly infect to replace it.
- So, if the assembly is in good condition and can be used for further, we service it and try to re-condition them.
- In servicing, we fill the oil and grease in the steering assembly with the help of bench wise, these can work as a lubricant.

Through this, it can work properly and for limited time, but leads for cost reduction.
Chapter 12.

❖ Safety Features

12.1 Safety in workshop:

- Wear goggles when working with welding machine, washer welding.
- Always wear hand gloves in workshop. Never misbehave in workshop during working time because sometimes your misbehavior causes major accident.
- Always wear helmet when you are working underbody.
- Always wear safety shoe.
- Keep your tool and equipment safely.

Wear safety shoes with non-skid rubber heels and soles. Steel-toe shoes are best for workshop

12.2 Safety features

12.2.1 Seatbelt
12.2.2 Anti-lock Braking System (ABS):
12.2.3 Air bag
12.2.4 Reverse camera

12.2.1 Seatbelt Operation: In the event of a crash, seatbelts are designed to keep you inside the car. Lap sash seatbelts are the most effective. Seatbelt warning devices help you and your passengers remember to buckle up

Benefits: Seatbelts are the single most effective way to protect you in a crash. They also reduce the risk that you or your passengers will collide with parts of the car (e.g. the steering wheel, dashboard, windshield, or even other occupants).

12.2.2 Anti-lock Braking System (ABS) Operation:
ABS reduces the risk of tires skidding under heavy braking. ABS uses sensors to detect when a Wheel is about to lock. ABS selectively releases and applies the brake to prevent the wheel from locking. 46
When this happens there may be a vibration or shuddering through the car and the brake pedal may pulsate. For ABS to work properly keep constant firm pressure on the brake pedal.

Benefits ABS helps drivers to:

- Stop the car quickly and safely on most surfaces
- Steer and brake heavily at the same time
- Reduce speed faster (crashing at a lower speed may reduce impact and injury).
12.2.3 Air bag

An airbag is a vehicle safety device. It is an occupant restraint system consisting of a flexible fabric envelope or cushion designed to inflate rapidly during an automobile collision. Its purpose is to cushion occupants during a crash and provide protection to their bodies when they strike interior objects such as the steering wheel or a window. Modern vehicles may contain multiple airbag modules in various side and frontal locations of the passenger seating positions, and sensors may deploy one or more airbags in an impact zone at variable rates based on the type, angle and severity of impact; the airbag is designed to only inflate in moderate to severe frontal crashes. Airbags are normally designed with the intention of supplementing the protection of an occupant who is correctly restrained with a seat belt. Most designs are inflated through pyrotechnic means and can only be operated once. Newer side-impact airbag modules consist of compressed air cylinders that are triggered in the event of a side impact vehicle impact.

12.2.4 Reverse Camera

A backup camera is a special type of video camera that is produced specifically for the purpose of being attached to the rear of a vehicle to aid in backing up, and to alleviate the rear blind spot. Backup cameras are alternatively known as 'reversing cameras' or 'rear view cameras'. It is specifically designed to avoid a Backup collision. The area directly behind vehicles has been described as a killing zone due to the associated carnage. The design of a backup camera is distinct from other cameras in that the image is horizontally flipped so that the output is a mirror image. This is necessary because the camera and the driver face opposite directions, and without it, the camera’s right would
Chapter 13.

Cost Estimates

13.1 Honda city petrol/diesel cost estimate:

Oil: Petrol car - 302 Rs. Per liter

Diesel car - 450 Rs. Per liter

Oil filter: petrol car - 220 Rs.

Diesel car - 400 Rs.

Air cleaner element: petrol car - 450 Rs.

Diesel car - 350 Rs.

Fuel filter: petrol car - 500 Rs.

Diesel car - 1350 Rs.

Brake oil: 450Rs. 500 ml.

Automatic Transmission oil: 750 Rs. Per liter

Manual transmission oil: 680 per liter.

Coolant per liter: 300 Rs.

Front brake pads: 3500Rs.

Throttle body cleaning: 400 Rs.

Spark plug: 450 Rs. Quantity 1
13.2 **Honda Civic maintenance cost:**

- Oil: synthetic oil-900Rs. per liter
- Oil filter: 210 Rs.
- Air filter element: 950 Rs.
- Pollen filter: 1100Rs.
- Brake oil: 650 per 500ml
- Fuel filter: 3500 Rs.
- Coolant: 1500 per liter
- Drive belt: 5500 Rs.
- Spark plug: 1000 Rs.

13.3 **Honda Accord cost estimate**

- Oil: synthetic oil- 1100 Rs. Per liter
- Oil filter: 210 Rs.
- Air filter element: 1350 Rs.
- Pollen filter: 1100 Rs.
- Coolant: 1500 Rs. Per liter
- Brake oil: 650 Rs. per 500 ml
- Fuel filter: 2600 Rs.
Automatic transmission oil: 1300 Rs. per liter

Manual transmission oil: 700 Rs. Per liter

Spark plug: 1000 Rs.

13.4 Honda CR-V cost estimate:

Oil: 450 Rs. Per liter

Oil filter: 220 Rs.

Air filter element: 2500 Rs.

Fuel filter: 4500 Rs.

Brake & clutch oil: 350 Rs.

Automatic transmission oil: 3000 Rs. Per liter

Manual transmission oil: 900 Rs. Per liter

Spark plug: 1100 Rs.

Coolant: 2000 Rs. Per liter

13.5 Honda Amaze cost estimate

Oil: petrol- 350 Rs.

Diesel - 450 Rs.

Oil filter: 400 Rs.

Air filter element: 800 Rs.

Fuel filter: 700 Rs.
Spark plug: 350 Rs.

Coolant: 2000 Rs. Per liter

Transmission oil: 1000 Rs. Per liter

**13.6 Other cost estimate:**

Brake pads: 3500-4000 Rs. As per car

Front bumper: 4550 Rs.

Rear bumper: 5150 Rs.

Bonnet/hood: 9770 Rs.

Front wind shield glass: 7,155Rs.

Rear wind shield glass: 5220 Rs.

Fender (left and right): 4700 Rs.

Head light (left and right): 6700 Rs.

Tail light (left and right): 3489 Rs.

Rear door: 18450 Rs.

Front door: 17200 Rs.

Intercooler: 10060 Rs.

Dickey: 10110 rs.

Condenser: 10,940 rs.
Chapter 14.

▶ Special Challenging Experience In My Industry

14.1 Challenges I face in workshop:

- First challenge is to manage myself in workplace.
- To manage with company’s rules regulation is also challenging work.
- Replacing spark plug first time is challenging work for me because I never done before it. Only I see how to replace it but when technician told me to replace spark plug it’s like challenge.

**Car: jazz**

> **Procedure:**
> - Disconnect battery negative terminal.
> - Remove valve head cover.
> - Now disconnect igniter sockets.
> - Unscrewed them and remove igniter.

![Igniter Image](image-url)
- After removing igniter remove spark plug.
- Now rearranged spark plug.
- Reinstall igniter and attach socket.
- Tight the valve head cover.
- Connect battery negative terminal.
- Switch on ignition to check spark plug work proper or not.

* Car: city 2014  
Challenge: noise check

- Customer complained that unnecessary noise comes from car when rough road drive.
- First we take test ride on rough road to identify the noise.
- The noise is come from back side of the car.
- So first we tighten and lubricate rear suspension system bolts.
- After this we again take test ride but noise comes from the car as it is.
- So we decide to replace rear damper for check.
- After replacing damper we take test ride but noise as it is.
- After we check rear seat boil joint we adjust them after this the problem of noise is solved.

* When first time me changing oil, oil filter, air cleaner that time its feel like challenge for me.

* While I was balancing wheel first time that time many thoughts in my mind like how I can done wheel balance, I can wheel balance properly or not, etc. but I take this opportunity as new challenge. And I done my work very properly.
Chapter 15.

❖ My Liking & Disliking Of Workshop

15.1 Likes:

- I really like to work in workshop.
- Staff of organization gives me friendly atmosphere.
- I like the workshop place there is enough space for to do work.
- The procedure of work is good.
- Their approach is always complete services in time to time. So their time management is good.
- Our service manager always in contact with job controller and technicians.
- If manufacturer advice about service related then manager share it with technicians.
- Organization always takes review from customer about service.
- Adviser listen customer carefully and behave very polite.
- They give proper answer for proper problem.
- All technicians work sincerely and give full dedication in his work.
- They technically sound.
- Technicians always do competitive work.
- They are very enthusiastic for work.
- Some time in major problem they work in team.
- In workshop all instruments, machine and tools are latest.
- Technician use all instruments, machine, and tools very carefully.
- They maintain machines and instruments time to time.
- All the technicians give me proper knowledge during my training.
- They taught me how to use proper tools for proper work.
- Store manager also taught me that always check new parts first it is damage or not.
- Match part’s no. with job card parts no.

15.2 Dislikes:

- I dislike with the garage area . because space of floor is more compact.
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  - Automobile electric system - www.ignou.ac.in/upload/Unit-3-61.pdf
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