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AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

Participant Handbook

Sector
Automotive

Sub-Sector
Automotive Vehicle Service

Occupation
Technical Service Repair

Reference ID: **ASC/ Q 1411**
NSQF Level : 4

Automotive Service Technician (2 &3 Wheelers)

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ASDC Contact Details:
Sat Paul Mittal Building, 1/6, Siri Institutional Area, Khel Gaon Road
New Delhi 110049
Email: info@asdc.org.in
Website: www.asdc.org.in
Phone: 011 4186 8090

Skilling is building a better India. If we have to move India towards development then Skill Development should be our mission.

Shri Narendra Modi
Prime Minister of India

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COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/Qualification Pack: 'Automotive Service Technician(Two and Three Wheelers' QP No. 'ASC/Q 1411 NSQF Level 4'

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Sunil K. Chaturvedi
Chief Executive Officer, ASDC

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The content of this handbook is aligned to the curriculum of QP/NOS for Automotive Service Technician (Two and Three Wheelers).

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We would also like to acknowledge the contributions of each and every stakeholder/ individual who have contributed directly or indirectly to the ideas presented in this book.

About this Guide

Indian Auto Industry is one of the largest in the world. The industry is expected to contribute 10% to India's GDP as per Automotive Mission Plan 2016-26 and create 65 million additional jobs. The sector offers big potential for jobs across the length and breadth of the country. In line with the rapid technological advancement in this field, there are exciting prospects for a fulfilling career in this industry.

This book is designed to enable a candidate to acquire skills that are required for employment. The content of this book is completely aligned to the National Occupation Standards QP/NOS and conform to the National Skills Qualification Framework (NSQF).

The Qualification pack of an Automotive Service Technician (2 & 3 Wheelers), Level-4 includes the following NOS's which have all been covered across the units:

1. **ASC/ N 1420: Carry out routine servicing and minor repairs of aggregates of two and three wheelers**
2. **ASC/ N 0001: Plan and organise work to meet expected outcomes**
3. **ASC/ N 0002: Work effectively in a team**
4. **ASC/ N 0003: Maintain a healthy, safe and secure working environment**

Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS. The symbols used in this book are described below.

Happy learning !!

Symbols Used


Learning Outcomes


Steps


Time


Tips


Notes


Objectives


Exercise


Activity

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1. Introduction

Key Learning Outcomes

At the end of this module, you will be able to:

1. Acquire knowledge of two and three wheelers history
2. Describe different types of automobile
3. Classify automobile industry
4. Explain role of auto service technician in automobile service to meet required responsibilities

Unit 1.1: Introduction to Automobile

Unit Objectives

At the end of this unit, you will be able to:

1. Acquire required knowledge of automobile industry
2. Describe type of automobile

1.1.1: Introduction to Automobile

We all are familiar with the word Automobile. We do also understand the meaning of automobile; it could be a car, two wheeler, bus etc. having its own engine and move using wheels for goods transport or carry passengers.

The automobile word has been taken from ancient Greek word which combine auto means self and mobilis mean movable thus we can define automobile as a vehicle which can move itself.

Car which is also an alternative name of automobile also seems to be taken from Latin word carrum which means wheeled vehicle or from French word cart. Most of these words seem to be taken from Gallic Chariot.

Most of the definition of automobile tells us that it is designed for roads and should have seating capacity ranging from 1 to 8 people, may have minimum 2 wheels and is designed for the purpose of transporting people and goods.

1.1.2: We Know Automobile by Different Names Like

- AutoRiksha
- Auto car
- Car
- Motor car
- Motor coach
- Horseless carriage
- Moped
- Scooter
- Truck
- Earth Moving Equipment
- Automobile
- Auto buggy
- Motor
- Motor vehicle
- Motor wagon
- Quadri Cycle
- Motor Cycle
- Bus
- Tractor
- Tumtum

Unit 1.2: History of Two and Three Wheelers

Unit Objectives

At the end of this unit, you will be able to:

Explain the history of two and three wheelers

1.2.1: History of Two Wheelers

Two wheelers history in India was started in the year 1955. Indian government was in need of strong, rough and tough motorcycles for Army and police forces in western part of India due to rough and rocky ground.

In India, Royal Enfield from United Kingdom introduced 350 cc “Bullet” as first batch of motorcycle. These motorcycles were brought to India in Chennai and started the journey of two wheelers industry in India.

During the period 50s to 70s India has observed the appearance of two wheeler industry. Few companies like Bajaj Auto, Royal Enfield, Escort started their operation but with limited production capacity. Two wheelers Industry started with small establishment by early 50’s. The first two heelers manufactured by Indian automobile industry was scoter. During initial stage of scoter production it was dominated by API but latter on taken over by Bajaj Auto. Enfield 350cc and escort 175cc bikes are the one who dominated Indian motorcycle segment.

Government of India decided location for setting up the plant the plants and issued license for manufacturing with restricted expansion. Two wheeler productions were under a lakh during the 70's and iconic brands like Royal Enfield' s bullet and Bajaj Auto's Chetak, Escort's Rajdoot won the hearts of Indian consumers. After almost decades of a monopoly for Bajaj Auto, things began to change.

During 70’s and 80’s new played was introduced in two wheelers manufacturing like Kinetic and LML scooters. During this period manufacturer got the best profit margin and the total production of two wheelers reached around 4 and half lakh units.

But the 80's proved to be the transformational decade. As during this period Indian company Hero tied up with Honda as heroHonda, TVS from India with Suzuki and Escorts from India with Yamaha. Actually it was hero-Honda who bring a major revolution by moving the market from scoter to bikes with stylish product having better technology and fuel economy. Market leader Bajaj was caught off guard but managed to fight back.

To make the market more comparative, India opened two-wheelers industry for foreign competition in the middle of 80s. During this period Indian manufacturer Escorts and Enfield were not aware about four Indo-Jap-anese joint ventures in 100cc bikes segment. Due demand driven towards fuel efficient low power bikes hero-Honda became the only producer of 100cc bike category in in four stroke segment.

Post liberalization the focus was on technology, pollution control, emission norms, increased competition and segmentation. Two wheelers production grew to almost 38 lakh units. Major revolution in 2 wheelers history has been observed in this period as Indian companies decided to be separated from their foreign alliance such as TVS Suzuki, Yamaha Escorts, Kinetic Honda.

Presently in two wheelers segment India is tagged as the second largest producer and also in other segment of automobile we contributes largest volume with an annual growth of 30%.

1.2.2: History of Three Wheeler

World have huge need of 3 wheelers. 3 Wheelers segment has always assured its existence in the automobile world and considered as one of the promising product.

Three wheelers vehicle has three wheels "human or people-powered vehicles" or power driven vehicle in the form of motorcycle or all-terrain vehicle. Three wheelers vehicles are also called by some other names like trikes, tri-cars and cycle cars. Tri-cycle terminology is merely in use but three-wheelers terminology is much in use for this motor vehicles. We can classify three-wheelers as automobiles or motorcycles.

Fig: 1.2.2.1: Three Wheeler for Ferrying Passengers

Basically we can say three-wheelers are motorcy- cle-based machines having single wheel in front and using engine similar to motorcycle and having rear axle similar to car axel. Three-wheelers are constructed as rear engine and front engine. Other tri-rickshaw includes all-terrain vehicle concept and constructed for off road use. It is also possible that three-wheeled vehicles may have two wheels at rear side and one on front side or two wheels at front side and one at rear side.

Fig: 1.2.2.2: Three Wheeler to Ferry Goods

World has also witnessed three wheelers micro cars manufactured for economic reasons in the countries like USA and UK for taking advantage in tax or taking advantage of lower safety regulation and classified as motorcycle. Due to having light weight construction and better reformation these three wheeled cars are economic to run.

Three wheelers is a transport vehicle and also called as Auto Rickshaw. In many countries it is used for public transportation. Auto Rickshaws constitutes an important mode of transportation for urban areas in developing countries such as India, and a form of novelty transport in many Eastern countries

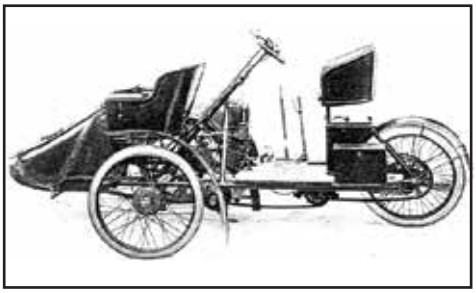

Fig: 1.2.2.3: Tri Car

Early car pioneer Karl Benz developed a number of three-wheeled models and one of the model called Benz patent Motor Wagen extensively considered as the first purpose-built automobile built in 1885.

In 1886 during great exhibition John Henry Knight presented a tri car.

But in the year 1897 butter petrol cycle was invented by Edward Butler in this segment.

It was further competed in 1907 by Conti 6hp tri car and a race called peeking to Paris was supported by Le Matin a French newspaper.

Auto rickshaw (Three Wheelers) – Called auto rickshaw in India, or rickshaw in Pakistan also known as a Bajay or Bajaj in Indonesia, three-wheeler or tuktuk in Sri Lanka, samosa, tempo, tuk-tuk in Thailand is a motorized development of the traditional pulled rickshaw or cycle rickshaw.

Auto rickshaw was introduced in India during 1959 by Bajaj auto. It was motivated from piaggio's ape c model which was itself based on the design of vespa two wheeler .the bajaj produced these under piaggio license. The government initially licensed the company to make 1000 autos a year.

Auto rickshaw in India is manufactured by various automotive companies like Mahindra & Mahindra, Bajaj Auto, TV Motors, Force Motors, Kerala Automobile, Kumar Motors etc.

Unit 1.3: Classification of Automobiles

Unit objectives

At the end of this unit, you will be able to:

1. Classify automobiles based on industry and other parameters
2. Describe recent development in automobile industry

1.3.1: Automobiles are Normally Classified into Two Categories

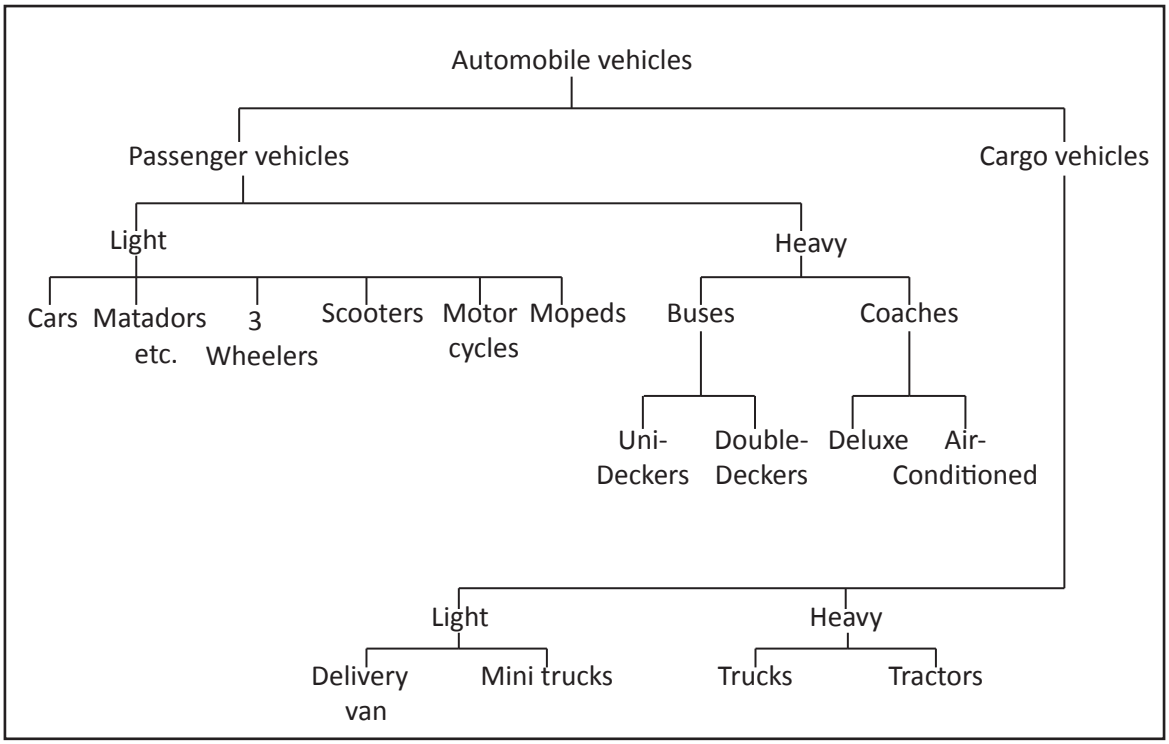

Fig: 1.3.1: Classification of Automobiles

1.3.2: Further the Automobiles can be Classified Based on Different Parameters

Purpose of Transportation:

1) Passenger vehicles — Car, Jeep, Bus
2) Goods vehicles — Truck

Capacity:

1) Light motor vehicles — Car, Motorcycle, Scooter
2) Heavy motor vehicles — Bus, Coach, Tractor

Fuel used:

1) Petrol vehicles — Car, Jeep, Motorcycle, Scooter
2) Diesel vehicles —Truck, Bus, Tractor, Bulldozer
3) Electric cabs — Battery truck, Forklift
4) Steam carriages — Steam road rollers

Number of wheels:

1) Two-wheeler
2) Three-wheeler
3) Four-wheeler
4) Six-wheeler

Drive of the vehicles:

1) Single-wheel drive vehicle
2) Two-wheel drive vehicle
3) Four-wheel drive vehicle
4) Six-wheel drive vehicle
5) Front wheel drive
6) Rear wheel drive
7) LHD : Left hand drive
8) RHD : Right hand drive

Normally automobile are specified as:

- **Type:** Car, truck, scooter, motorcycle, bus
- **Capacity**: 5 ton, 3 ton, 1 ton, 4-seater, 6- seater, 30-seater, 45-seater
- **Manufacturer or Make of the vehicle**: Tata, Maruti, Suzuki, Ashok Leyland, Mahindra, Honda, Hyundai, Toyota, Ford, Fiat, Chevrolet, Audi, Mercedes, Isuzu, Skoda, Volkswagen
- **Drive**: LHD: Left hand drive, RHD : Right and drive, Single wheel drive, Two wheel drive, Four wheel drive, Six wheel drive

- **Model**: Year of manufacturing or chassis code number

The vehicle identification number is the identification code (VIN) marked on each and every auto-mobile. The VIN number is unique in nature and two vehicles cannot have same VIN as it is used as unique identification mark for the vehicle. Usually VIN have 17 alpha numeric code.

Fig: 1.3.2: Sample VIN Number

1.3.3: Developments in Indian Automobile Industry

- In 1942 Hindustan Motors was established by CK Birla Group, in 1948 the Production of the iconic Ambassador was started.
- In 1947 Mahindra got the license to build jeep SUVs in India and thus introduced the utility Segment in India.
- In 1954 Indian Government ordered 800 motorcycles for security force on Pakistan's border
- In 1955 finally Bullet hits Indian ground and still its most lovable motorcycle of India
- In 1960's Bajaj introduced two wheelers scooters
- In 1972 Bajaj launches Bajaj chetak scooter. It's based Paggio Vespa
- In 1980's the Indian Auto Industry had limited supply of vehicles and most of them were outdated
- In 1983, Maruti Udyog Limited entered the Indian Automotive sector
- In 1983 the Escort group launches Rajdoot 350.
- In 1984 Yamaha lunched RX100 which is still bikers choice
- In 1985 Hero honda lunched CD 100 model in market with special feature like high fuel efficiency and low emission
- Around 1985 TVS group lunched ind-Suzuki Ax100 which does not make more success like others.
- In 1996-1998 Hyundai Motors entered the Indian Automobile Sector
- In 2010 Hero and Honda group separated for their joint venture and started operating independently with their individual brand name Honda & Hero

Unit 1.4: Job Role of Auto Service Technician

Unit Objectives

At the end of this unit, you will be able to:

1. Explain role of auto service technician at automobile service centre
2. Describe Key responsibilities of service technician

1.4.1: Role of an Auto Service Technician at Automobile Service Centre

Growing Importance of After Sales in Auto Industry:

- The role of the companies does not end with selling the product only. In fact, with the ever growing competitive market, it is completely important for every company to equally work hard in after sales.
- This includes product quality and sustains performance which leads to customer satisfaction
- After sales service should ensure that customers are happy and satisfied not with the product only but also the service the organization offers.

Role of After Sales in Auto Industry Ensures:

- Product and service meet or exceed the customer's expectation;
- Customer believes and trust in the brand;
- A strong bond between the organization and the customer;
- Earn more customers through reference from old ones;
- Earn more revenues and profits in the market.

The Technicians Play an Important Role for the Workshop Profitably:

- A productive Workforce of technically sound people will ensure / customer satisfaction and retention.
- A proper workshop has room for different work activities.
- An organization chart defines the reporting structure of the workshop.
- A well-defined service process ensures a smooth running of the workshop.

1.4.2: Service Process

- Vehicle Booking: In this process the appointment is taken by the service advisor from the customer for the service job. When the customer calls for an appointment to service his vehicle the SA will allot time and date for him to bring his vehicle to the workshop as per the work schedule.

- Vehicle Receiving and job card opening: the SA will receive booked vehicle and open a job order. A job order or a job card is a document which has details of the customers and the vehicle along with the job to be carried out on his vehicle. The customer has to ensure that his and his vehicle details are correctly entered and the jobs and his vehicles problems are correctly recorded on the job card before signing the JC.

- Job Allotment: The workshop Supervisor allots the jobs to the technicians as per the schedule and priority and delivery commitments.

- Work progress: The technician's carries out the work as prescribed in the job order. He will intimate the supervisor if any additional job has to be done on the vehicle. An estimate of the job if required is given. On completion of the job the vehicle is sent for final inspection.

- Final Inspection: The quality tester will perform the final inspection of the vehicle .He ensures that the job requested by the customer is carried out and the reported problems in the vehicle are solved. He sent the vehicle to washing after his inspection.

Notes

Exercise-1: Fill in the Blanks

1. The first batch of motorcycles in India was .....

A. Royal Enfield B. Rajdoot C. Yamaha D. Heo Honda

2. Two wheeler productions in India during 70's was.....

A. Around a lakh B. More than lakh C. Two lakh D. Three lakh

3. The name of automobile brand that moved the Indian market from scooters to bikes with the promise of fuel economy is .....

A. Escort B. Suzuki C. Bajaj D. Hero Honda

4. India is ..... Largest producer of two wheelers

A. 2nd B. 3rd C. 4th D. 5th

5. Rare axle of three wheelers is similar to .....

A. Bus B. Truck C. Car D. Train

6. Autorickshaw was introduced in India by .....

A. Tata Motors B. Baja Auto C. Mahindra & Mahindra D. Force Motors

7. Unique number marked on each vehicle is called .....

A. Vehicle identification number B. Vehicle serial number C. Vehicle log number

D. Automobile serial number

8. Bajaj introduced two wheelers scooters in the year .....

A. 1950 B. 1940 C. 1960 D. 1970

9. Hero and Honda group separated for their joint venture in the year .....

A. 209 B. 2010 C. 2011 D. 2012

10. One of the important role, after sales in auto industry is .....

A. Ensure strong bond between the organization and the customer

B. Make customer happy

C. Earn revenues

D. Learn good practices

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2. Carry out Routine Servicing and Minor Repairs of Aggregates of Two and Three Wheelers

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Unit 2.1 – Scope of Work and Job Description

Unit 2.2 – Performance Criteria for Auto ServiceTechnician

Unit 2.3 – Technical Knowledge

Unit 2.4 – Skills: Automotive Technician

ASC N 1420

Key Learning Outcomes

At the end of this module, you will be able to:

1. Explain the organizational context for the automobile service station
2. Operate various tools and equipment required for vehicle diagnostic
3. Operate various tools and equipment required for vehicle repair
4. Diagnose the defect and performance issues in various component / sub-assemblies of the vehicle
5. Analyze root cause of the fault and prepare repair requirements of the vehicle
6. Carryout repair job of major aggregates and sub assemblies of the vehicle
7. Carryout routine servicing and maintenance requirements of the vehicles
8. Analyze customer complains / requirements
9. Prepare job card having information of the customer, vehicle and repair requirement
10. Prepare document based on the action taken for the complaint registered in the job card

UNIT 2.1: Scope of Work and Job Description

Unit Objectives

At the end of this unit, you will be able to:

1. Explain the scope of work for an auto service technician
2. Perform the responsibility of auto service technician

2.1.1: Scope of Work

Scope

SECTOR	AUTOMOTIVE
SUB-SECTOR	AUTOMOTIVE VEHICLE SERVICE
OCCUPATION	TECHNICAL SERVICE & REPAIR
JOB ROLE	AUTO SERVICE TECHNICIAN 2 & 3 WHEELERS LEVEL 4
REFERENCE ID	ASC/ Q 1411
ALIGNED TO	NCO-2004/7231.50

Auto Service Technician (Two & Three Wheelers) is also known as Mechanic, Technician, 2 Wheeler Technician, Repair & Maintenance Technician.

Brief Job Description: An Auto Service Technician (two and three wheelers) is responsible for the repairing and routine servicing & maintenance (including electrical and mechanical aggregates) of two / three wheeler vehicles.

Personal Attributes: An individual on this job must have good communication and interpersonal skills in addition to being a team player, as the job requires coordination with other technicians as well. The individual must have a technical bend of mind to understand the technical aspects of a two/ three wheeler which may be different from a four-wheeler. The individual must know how to drive a two/ three wheeler to practically test drive and identify any additional repair or service requirements in the electrical and mechanical aggregates.

Role Description: Carry out routine servicing and minor repairs of aggregates of two and three wheelers

Performance Criteria:

Your Role: To carry out service, repairs and maintenance activities of various aggregates (including electrical and mechanical aggregates) of two and three wheelers

Fig: 2.1.1.1 Motorcycle

Fig: 2.1.1.2 Scooter

Fig: 2.1.1.3 Autoriksha

Your work involves:

Perform routine servicing of two/ three wheeler including various aggregates (scheduling, either free or paid maintenance)

Perform maintenance activities of the two/ three wheeler vehicle (oil, lubricant, coolant change and greasing etc are included)

Perform minor service and repair of two/ three wheeler vehicle (including mechanical and electrical aggregates)

Your work begins:

As soon as a Customer walks in the Service Centre:

Fig: 2.1.1.4 Scooter

2.1.2: Job Description

Eligibility Criteria:

Minimum Educational Qualifications: Class X

Maximum Educational Qualifications: ITI or Diploma in Mechanical / Electrical / Automobile Engineering Training: (Suggested / Not Mandatory)

On the job training:

- Desirable for ASDC Auto Service Technician (two and three wheelers) Certificate or Diploma in Automotive Repair
- Compulsory for all other qualifications

Experience: # 1-2 years if ASDC Auto Service Technician Level 4

Certificate or Diploma in Automotive Repair

3-5 years for other qualifications

Occupational Standards (OS):

Compulsory:

1. ASC/ N 1420: Carry out routine servicing and minor repairs of aggregates of two and three wheelers
2. ASC/ N 0001: Plan and organise work to meet expected outcomes
3. ASC/ N 0002: Work effectively in a team
4. ASC/ N 0003: Maintain a healthy, safe and secure working environment

Optional:

N / A

Performance Criteria: As described in relevant NOS units

2.1.3: Assist in Performing Diagnosis of Vehicle for Repair Requirements

Your Role: Assist in troubleshooting problems and fault diagnosis of the vehicle (including both mechanical and electrical aggregates)

The Work Involves:

- Assisting the senior technician in identifying & diagnosis of the operational fault responsible for the root cause of the vehicle trouble
- Assisting in taking necessary action post the root cause analysis to repair the vehicle

2.1.4: Your Work Begins

As soon as a customer walks in the service centre :

Fig 2.1.4 Auto Service Station

UNIT 2.2: Performance Criteria for Auto ServiceTechnician

Unit Objectives

At the end of this unit, you will be able to:

1. Prepare vehicle check list as per organization SOPs
2. Resolve customer queries for the repair requirements of the vehicle
3. Carryout service job based on job card

2.2.1: On the Job Performance Criterion

Your work involves:

The following points are important for your on the job performance:

- Courteously greet the customer with a warm welcome
- Receive the vehicle
- Collect and safely handover the customer's personal belongings of customer like phone, pen, documents, water bottles etc, to the customer
- Fill in the job card after carefully listening to the customer's problems in the vehicle
- Carefully note down on the job card, damages like dent marks, already present on the vehicle at the time of receiving the vehicle

2.2.2: Job Card

A job card is a sheet that contains details about the customer, vehicle, customer repairs requests, and instructions by service advisors, time and cost estimate, vehicle inventory and vehicle handover.

Check List			
Sr. No	**Description**	**Not OK( )**	**Remark**
1	**Transit Damages**		
1.1	Front fender		
1.2	Head lamp / Housing front / Visor		
1.3	TSL Indicators LH & RH		
1.4	Clutch & brake levers position & scratch		
1.5	Damper handlebar scratches		
1.6	Fuel tank assembly		
1.7	Fuel tank covers		
1.8	Cover frames / Tail covers		
1.9	Pillion handle		
1.10	Seat		
1.11	Silencer guard (Front & Rear)		
1.12	Saree guard		
1.13	Others (if any specify)		
2	**Missing items if any**		
2.1	Split pins		
2.2	Rider/ Pillion footrest rubber		
2.3	Any other items		
3	**Fasteners Tightness**		
3.1	Front axle nut		
3.2	Rear axle nut		
3.3	Rear shock absorber mounting nuts		
3.4	Swing arm nut		
3.5	Engine mounting bolts		
3.6	Footrest mounting bolts		
3.7	Damper handle bar screw		
4	**Standard checks**		
4.1	Front & rear wheel for free rotation		
4.2	Front & rear wheel for any noise		
4.3	Key function - ignition, tank steering , cover frame		
4.4	Digital speedometer - self check		
4.5	Mode and set switch operation / function (Check Odo, trip meter A&B and digital clock)		
4.6	Fuel gauge and warning light function		
4.7	Clutch cable operation / free play		
4.8	Centre / side stand operation		
4.9	Drive chain slackness		

4.10	Rear fender alignment		
4.11	Steering operation		
4.12	Front & Rear brake play		
4.13	Front & Rear tyre pressure		
4.14	Engine / gear box oil level - dipstick		
4.15	Gear lever & brake pedal position w.r.t rider footrest		
5	**Start the engine after petrol in tank**		
5.1	Startability		
5.2	Kick / Self starter functioning		
5.3	Ignition cut off / kill switch function		
5.4	Cold recovery - Throttle response		
5.5	Tachometer function		
5.6	Oil / fuel leak if any		
5.7	Any abnormal noise		
6	**Electrical check - engine running**		
6.1	Head lamp & parking lamp ON/Off		
6.2	High beam low beam & focus		
6.3	Rear combination lamp - brake & tail (LED)		
6.4	Speedo panel bulbs (LED)		
6.5	Turn signal lamp (Front & Rear)		
6.6	Battery terminal jelly application		
6.7	Horn function		
7	**Road trial**		
7.1	Gear shifting		
7.2	Front & Rear brake effectiveness		
7.3	Speedo / Odo / trip meter display and function		
7.4	Suspension - front- rear		
7.5	Steering shake - on braking		
7.6	Idling RPM stability (Use tachometer to evaluate)		
7.7	Any other abnormality		
8	**Accessories fitment**		
8.1	Mirrors alignment		
8.2	Tool kit		
9	**Any other observation (Specify)**		

Tab: 2.2.2 Vehicle check list

The following points are important:

- Note the functioning of all the electric bulbs and see if some are already fused
- Note down the fuel level in the fuel tank
- Note down the odometer kms reading
- Strictly follow the SOP : Standard Operating Procedure
- Securely park the vehicle at the proper designated place
- Place the vehicle on a suitable platform, before the repair / painting work actually begins
- Study &understand the auto component manufacturer specifications related to the various components/ aggregates in the two/ three wheeler vehicle
- Study &follow standard operating procedures for using workshop tools and equipment for service and minor aggregate repairs in the two/ three wheeler vehicle
- Conduct test drives to assess need for repairs, calibration or any other adjustments in the electrical / mechanical aggregates in the two / three wheeler vehicle

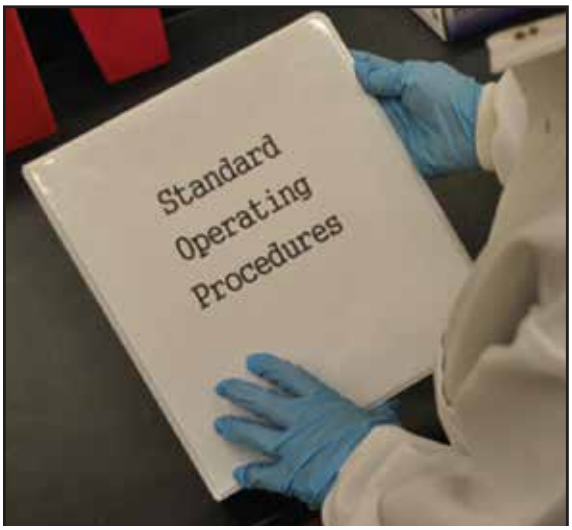


Fig: 2.2.2.1 Standard Operating Procedure Manual

Fig: 2.2.2.2 Standard Operating Procedure Manual

- Review the job card and understand work to be carried out
- Ensure OEM recommended procedure and checklist is followed for routine servicing in case of non-routine service or repair, confirm tasks to be carried out with superior
- Calibrate, align and adjust settings, alignment, pressures, tension, speeds and levels relevant to:
  - Engine and aggregates
  - Transmission system
  - Chassis
  - Electrical and electronic components

- Engine and aggregates
- Transmission system
- Chassis
- Electrical and electronic components
- Scooter (two stroke engine)
- Scooter (four stroke engine)
- Motor cycle (two stroke engine)
- Motor cycle (four stroke engine)
- Disc & drum brakes system
- Other components (including to valves, ignition, fuel and emissions, transmission, lights, tyres, steering and body fittings)

- Ensure that for routine maintenance and service, the correct spare parts and appropriate grade of lubricants, coolant, oils and grease required have been obtained
- Ensure all dismantled components (including mechanical and electrical aggregates) are cleaned and conditioned prior to reassembly
- Identify and change components requiring change due to continuous wear and tear including:
  - Oil and air filters
  - Belts
  - Wiper blades
  - Brake linings and pads
  - Drive
- Ensure disposal of materials (including waste oil, scrap of failed parts/aggregates) in accordance with the organisation's policies
- Understand the various precautions to be taken to avoid damage to the vehicle and its components while working on other aggregates
- Record all service and repairs carried out and ensure completeness of tasks assigned before releasing vehicle for the next procedure
- Ensure all workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs where necessary

- Ensure any malfunctions observed in tools and equipment are reported to the concerned persons
- Ensure any other repair requirements observed in the other components/aggregates systems (like engine, gear box etc.) while repairing/ overhauling of braking systems are reported to supervisor/ service advisor for further inspection by other specialists
- Be able to measure/ inspect the machining or any other repair done from an outside source/ local machining garages
- Utilise any computer-based applications relevant to service and repairs
- Ensure that trainings organized by the OEM from time-to-time are attended and knowledge levels are upgraded (esp. in case of newly launched products, product refreshes)

UNIT 2.3: Technical Knowledge

Unit Objectives

At the end of this unit, you will be able to:

1. Explain the organizational context for the automobile service station
2. Explain various automobile terminologies
3. Identify and learn automobile aggregates
4. Identify and learn the function of various components in automobile
5. Operate various tools and equipment required for vehicle diagnostic
6. Operate various tools and equipment required for vehicle repair
7. Diagnose the defect and performance related issues in various component / sub-assemblies of the vehicle
8. Analyze root cause of the fault and prepare repair requirements of the vehicle
9. Carryout routine servicing and maintenance requirements of the vehicles
10. Carryout repair job of major aggregates and sub assemblies of the vehicle
11. Interact with customer and prepare documents like job card, action report

2.3.1: Organisational Context

Organisational Context (Knowledge of the Company/Organisation and its processes):

Study & understand the following:

SOP : Standard Operating Procedures for servicing and minor repair of vehicles as prescribed by the OEM/ dealership

Fig: 2.3.1.1 Scooter

Fig: 2.3.1.2 Autoriksha

- Standard schedules and checklists recommended by the OEM/ auto component manufacturer for servicing of two and three wheeler vehicles
- Identification codes, nomenclature and grades of lubricants, components and aggregates
- SOP : Standard Operating Procedures recommended by the dealership / auto components suppliers / OEM for using tools and equipment to be followed related to aggregates / components (including electrical and mechanical aggregates) as per the manufacturer instructions
- SOP :Standard Operating Procedures for rectification of errors in information (e.g. rectification of job card, reissue of correct tools and equipment etc.)
- Safety requirements for equipment and components prescribed by the OEM (e.g. preventing / dealing with oil spillage and inflammable materials)
- Documentation requirements for each procedure carried out as part of roles and responsibilities as specified by OEM/ auto component manufacturer
- Organisational and professional code of ethics and standards of practice
- Safety, health and environmental policies and regulations for the workplace as well as for automotive trade in general (e.g. safe working practices inside pits/under vehicles)

2.3.2: Anatomy (Aggregates) of an Automobile

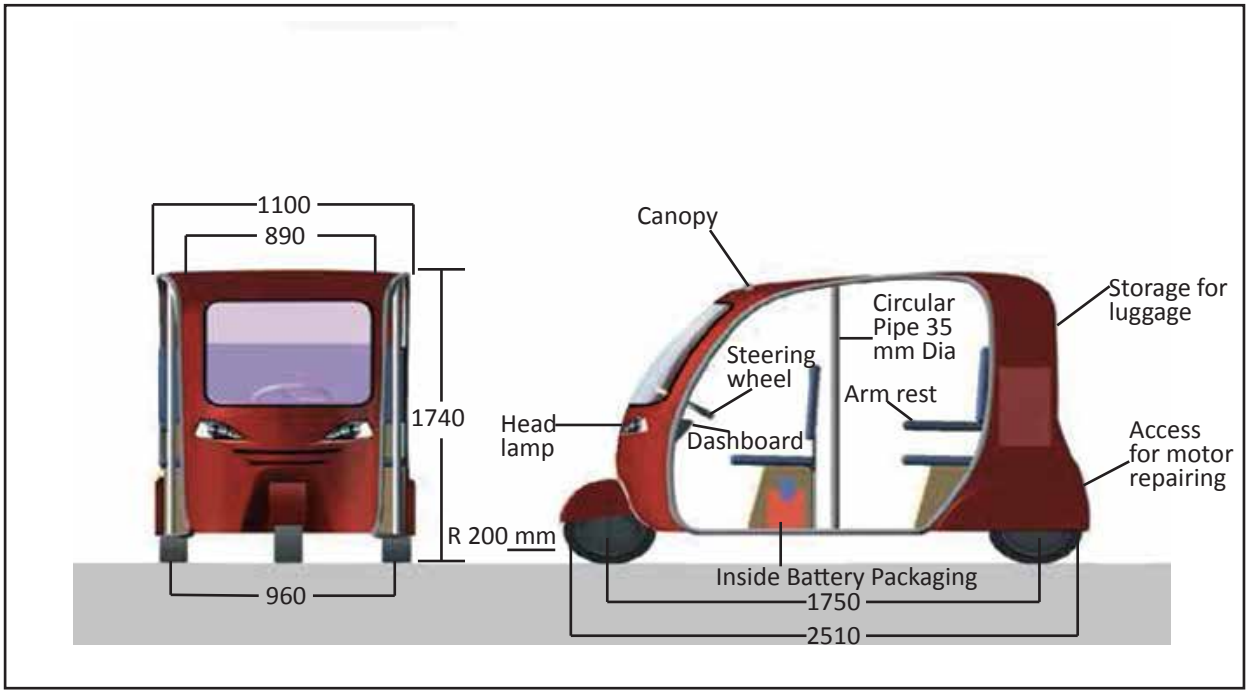
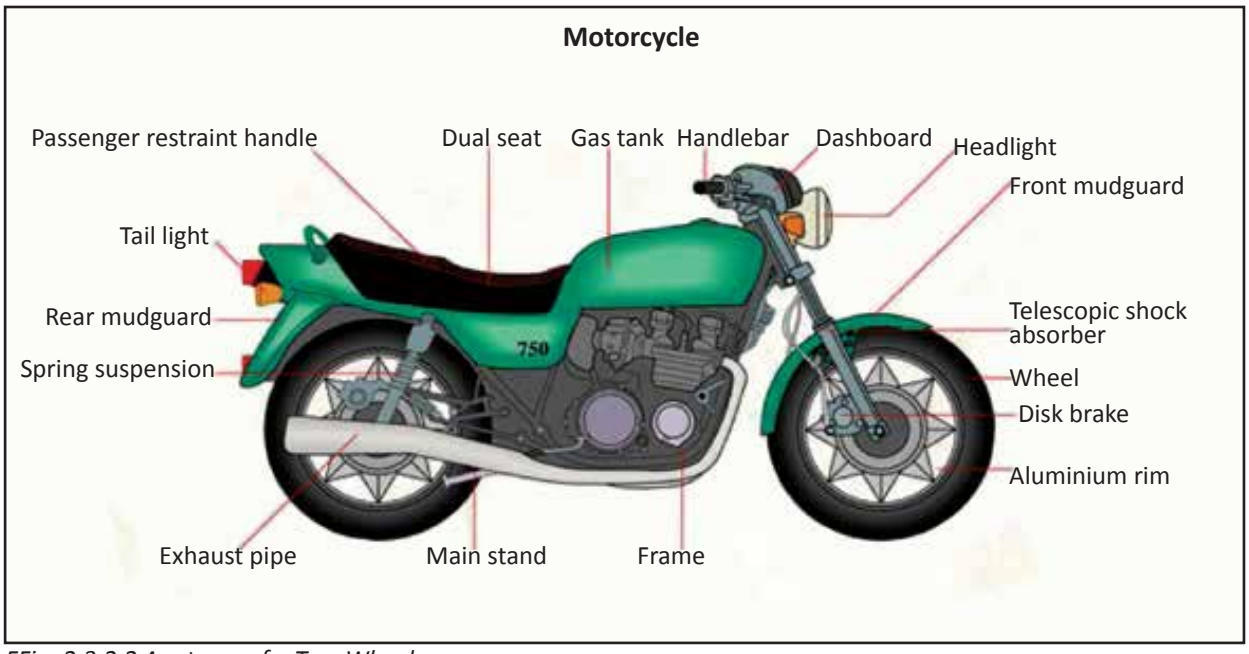


Fig: 2.3.2.1 Anatomy of a Three Wheeler



FFig: 2.3.2.2 Anatomy of a Two Wheeler

Introduction

Automobiles are made up of several components, assemblies and systems. The growing auto industry has given rise to a growing auto component manufacturing industry also. India has now become outsourcing hub for manufacturing of various automobile components. Many reputed automobile brands like Hyundai, Volvo, Renault, Toyota and many other companies are now obtaining their automotive spare parts from Indian manufacturers.

The auto components industry is predominantly divided into five segments

- Engine parts
- Drive Transmission & Steering Parts
- Suspension & Brake Parts
- Electrical Parts
- Body and chassis

Indian is now being seen as manufacturing hub by global manufacturers of automobiles due to

- Raw material availability and labour force at low cost thus it is cost competitive
- Very good setup of manufacturing base
- Several internationally know auto components manufacturers like Bosch, Visteon, Meritor just to name a few have already did their operational setup in India
- Automobile manufacturers and auto component manufacturers have
- Set up International Purchasing Offices (IPOs) in India.
- Fine-quality components are manufactured in India.
- India is a global hub for R&D: GM, Daimler Chrysler, Bosch, Suzuki, Johnson Controls etc. All have their research centre in India.

In this Unit, you will learn about various components and systems that makeup a complete automobile. Therefore you will be introduced to engine and its part, Body and chassis, Drive Transmission & Steering Parts, Suspension & Brake Parts, Electrical Parts and other systems that make it possible for running of an automobile.

The chassis

The word chassis is basically taken from French language and is basically used as main structure of the vehicle. Some time it is also called frame of the vehicle. The chassis consists of all the major units required for the vehicle for motion guidance, smooth running, on any type of surface etc. Body of vehicle and all required components are mounted on the chassis.

Chassis basically includes two major components

1. Steel frame forms the major part of chassis
2. In car segment the whole body of car is considered as chassis integral part whereas in most of the commercial vehicle body of the vehicle is not a part of chassis. Thus we can say that chassis is almost a complete vehicle except body, other accessories not related to vehicle movement.

The main job of chassis is :

1. Carries the vehicle weight along with passenger or goods
2. Should survive with engine and transmission torque also the torque generated during vehicle acceleration and breaking
3. While cornering the vehicle it should also manage centrifugal torque
4. To withstand the bending loads and twisting due to the rise and fall of the front and rear axles

Motorcycle chassis

The motorcycle chassis made-up of multiple components like suspension, wheel, frame and brakes. These components are explained below briefly

Frame

Frame of a motorcycle may make of either steel or aluminium hollow tubes which acts as a skeleton. Components like gear-box and engine are mounted on frame. It also serves for maintaining motorcycle handling so that the wheel should be in line. Frame also acts as suspension system support.

Fig: 2.3.2.3 Frame of a Motorcycle

Suspension

Suspension system consists of multiple springs and shock absorbers. It helps in maintain vehicle contacts with the road and acts like pillow for the rider from strike and jerk. The most common solution for the rear suspension is swing arm design. One end of the swing arm embraces rear wheel axel where as other end through the swing arm pivot volt it attaches to the frame and further extends to upwards and just below the seat it get attached to the top of the frame. A telescoping fork is used for the mounting of front wheel and axel having internal shock absorber with internal or external springs.

Fig: 2.3.2.4 Suspension of a Motorcycle

Wheels

The most common wheels used in motorcycle is made up of steel rims with spokes but some latest motorcycles also use alloy wheels which allows the use of tubeless tyres. Steel Rim wheel has to use pneumatic tyres with inner tube to hold the compressed air. In tubeless tyres to maintain the tyre pressure air is suppose to be held between rim and tyre.

Fig: 2.3.2.5 Wheels of a Motorcycle

Tube based tyres are more sensitive to blow out compare to tubeless tyre. On rough road surface tubeless tyres are not the right choice as eve a small bend in rim during driving can cause a deflation. There are variety of tyre designs based to meet the needs of surface type and driving condition. For example a dirt two wheeler tyre is more suitable for dirt or stony surface as it has deep and knobby treads to maximize the grip where touring two wheelers tyres which is made of harder rubber generally last longer but the disadvantage is that it provides less grip on the road. Tyres used for sport bikes provides amazing gripping power even with a small contact with road surface.

Fig: 2.3.2.6 Wheels of a Three Wheeler

Brakes

Both the front and rear wheel of a motorcycle have a brake. Front brake is activated using a hand lever on the right grip where as the rear brake is applied with the right foot pedal. Drum brakes were common until the 1970s, but most motorcycles today is using disk brakes for superior performance. Disc brakes contain a disc made up of steel and connected to the wheel and sandwiched between brake pads. Disc brakes are operated through hydraulic pressure. When the rider apply brake, pads grasps against the disc on both side due to hydraulic pressure which result in friction between the disc and attached wheel to slow down or stop the bike. Brake pads need to be replaced periodically because the pad surfaces wear away after repeated use.

Fig: 2.3.2.7 Brakes

Fig: 2.3.2.8 Auto Rickshaw

Fig: 2.3.2.9 Brake Assembly

Seats and accessories

Seat of motorcycle is designed such a way that rider and one more person can seat comfortably. It can be removed very easily from the body and located at the back of fuel tank. In few motorcycles it also provides a small compartment underside used a cargo compartment. In case a bigger storage space is required in the motorcycles plastic boxes or leather pocket can be mounted on either sides of the rear wheel. Larger motorcycles have the capacity to even pull a small trailer or a side Basically sidecars is having its own wheel to support along with a seating compartment for the passenger.

Fig: 2.3.2.10 Motor Cycle Seat and Rear-View Mirrors

Engine

Engine is heart of an automobile. Its role is very important. It converts the Chemical Energy (heat energy) to Mechanical Energy. This energy is utilized for vehicular movement. There are different ways of igniting fuel in an auto engine. Accordingly, engines are called Internal Combustion (IC) OR external combustion Engines. Even within the IC engine category ignition can be by a spark or by high compression.

Automotive engines are called internal-combustion (IC) engines. In this type of engine fuel is getting burned internally, or inside the engines. IC engine can be classified n two categories: reciprocating engine and rotary engine.

Reciprocating means moving up and down, or back and forth. Almost all automotive engines are of the reciprocating type. This type of engine is called a piston engine.

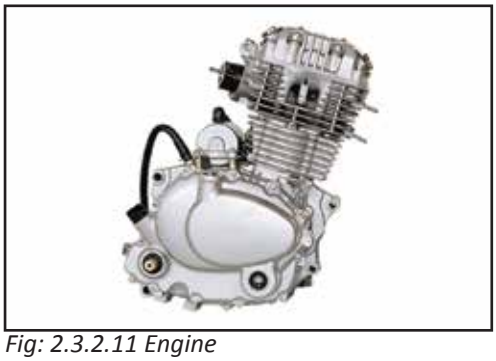


Fig: 2.3.2.11 Engine

Transmission system

Transmission system is one of the important systems in motor vehicle. The job of a transmission system is to supply output of engine to the drive wheels. Transmission is helping to reduce the higher engine speed to give slower speed to wheel thus the torque is getting increased in this process. As the transmission is a basic requirement it is also used in bicycles or wherever the speed of rotation and torque needs to be modified.

Fig: 2.3.2.12 Transmission System

The transmission system contains following components:

1. Clutch assembly

2. Gear box assembly (transmission case assembly)

3. Propeller shaft

Clutch assembly

The devices having two rotating shaft generally need a clutch for either locking both the shafts or decouple the shafts. Generally in this type of arrangement one shaft is motor or pulley driven whereas the other shaft driving another device. Job of a clutch is to connect both the shafts either for locking together so that they can spin at the same speed or decoupled to spin at different speed.

Fig: 2.3.2.13 Clutch Assembly

Gear box (Transmission case) assembly

We need different gear ratios in the gear box or transmission system to enable the vehicle move in different speed. At the time of starting the vehicle, maximum amount of torque available on the fly wheel, for which low gear ratio has to be selected for the movement of the vehicle. As the engine speed increases the amount of torque is reduced in the fly wheel and it is required to select higher gear ratio.

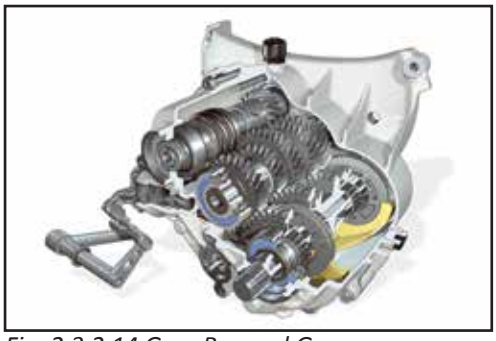


Fig: 2.3.2.14 Gear Box and Gear

Front and rear axle

Front axle

Front axle is usually a drop forging of steel. Job of an axel is to manage bending load as well as torque load which come when we apply brakes on wheel. Due to this cause front axle is placed in the central position as I-section. Both the ends of axel is usually in circular shape.

A downward clearance is given to the centre portion so that a low chassis height can be maintained. Both the end of front axle is mounted with stub axles using king pin. The front wheel is placed on stub axles.

Fig: 2.3.2.15 Rear Axle

Fig: 2.3.2.16 Front Axle

The functions of rear axle are as follows:

1. It bears the weight of vehicle body and load due to occupants through springs.
2. It enables to transmit driving and breaking torque to the chassis frame and body of the vehicle.
3. It also experience the side thrust or pull due to any side load on the wheel.
4. It supports the bevel pinion (drive from propeller shaft transmit to the pinion), bevel gear, cage of sun gear and star pinions, axle shafts and different support bearings.
5. Rear road wheels are mounted on the axle shaft.
6. The differential mechanism enables to move outer wheel faster than the inner wheel while taking a turn.
7. It helps in achieving the self-straightening effect.
8. It converts steering wheel circular movement into an angular turn of the front wheel.
9. It multiplies the effort of the driver by leverage in order to make it fairly easy to turn the wheels.
10. It prevents the road shocks to pass on driver hands by absorbing the road shocks.

Steering system

- Steering is used to rotate the front wheels of vehicle by using hand operated steering handle. It is basically positioned in the front side of the rider.
- Steering system contains steering column and universal joint which helps in turning vehicle from a straight line.

Functions of steering system

1. Helps in moving front wheel left to right or vice versa.
2. Turn the vehicle as per driver will.
3. Provides directional consistency.
4. Maintaining tyres wear and tear
5. It helps in achieving the self-straightening effect.
6. It converts steering wheel circular movement into an angular turn of the front wheel.
7. Multiples driver effort for a fairly easy turning of wheels
8. Prevent transmitting major part of the road shocks on driver's hand

Fig: 2.3.2.17 A Motor Cycle

Suspension system

Suspension is basically a terminology refers to springs, shock absorbers and linkage of these used to connect the vehicle with its wheels. Suspension is used mainly for two purpose:

- For a safe and pleasant drive by road holding and proper braking
- Minimize road noise, bump and vibration so that rider can have comfortable drive

Fig: 2.3.2.18 Front and Rear Shockers, Suspension of a Two Wheeler

Fig: 2.3.2.19 Front and Rear Shockers, Suspension of a Three Wheeler

Importance of suspension system

The main purposes of suspensions system are as follows:

1. Provide riding comfort by protecting against road shocks
2. Road shock stress is reduced on the rider and act as cushion
3. Maintain the vehicle body in level while driving over rough or bumpy ground. i.e. wheels up and down movement should be relative to the body
4. In a irregular road surface isolate vehicle structure from shock and vibration without impairing its stability
5. Provide the requisite height to body structure as well as to bear the torque and braking reactions

Functions of a suspension system

1. Provides comfort
2. Offer cushion effect to rider
3. Strain on the frame which comes due to road shock is reduced
4. Body level is maintained and prevents it from progressing
5. Maintain the tyres contact with road by providing good road holding
6. Driving torque transfer to the wheel and also breaking forces to chassis

Wheel and tyre

Wheels form an important component of any vehicle. Wheel is assembly hub, disc or spokes, rim, tyre and tube. It supports the vehicle weight and also protects the vehicle from the shocks. It should have the capability of resisting breaking stresses and maintain side thrust.

Functions of the wheel

1. Strong enough to hold the vehicle weight
2. Flexible enough so that it can absorb road shocks
3. Able to grip the road surface.
4. Perfectly balanced dynamically and statically.
5. Light and easily removable.

Rim

RIM is a metallic component of the vehicle which is used to hold the tyre and tube. On the wheels outer circular design inside edge of the tyre is mounted on vehicle. For example wheel used in bicycle is a large ring attached to the spokes of the wheel which is holding tyre and tube.

Fig: 2.3.2.20 Rims and Tyres of a Three Wheeler

Different types of wheel rims

- Disc wheel rim
- Wheel rim (used in motor cycle, bicycle)
- Split wheel rim (used in scooter)
- Heavy vehicle wheel rim (available in three piece and four piece including locking ring)
- Wire spoke

Wheel rim is used for mounting of tyre. It bears load of vehicle and offer cushioning effect to rider. While turning on road produce minimum noise. Resist vehicle tendency of over steer. Provide better grip to the vehicle during accelerating and braking on all types of road condition.

Function of tyre

1. Carry the load of the vehicle
2. Absorb the small road shocks
3. Reduce the vibration to some extent.
4. Transmit the engine power through gearbox propeller shaft and rear axle to the ground with which the vehicle moves.
5. The treads made on the tyres grip the road for better traction

Brake

Brakes are also known as control system of vehicle. It is one of the most import components of vehicle. It is used to stop or slow down the vehicle as and when required in a smaller distance. Brake performs this job by converting kinetic energy into heat energy which is getting disperse into the atmosphere.

Fig: 2.3.2.21 Components of the Engine

Functions of brakes

There are two distinct functions of the brakes:

1. Stopping or slowing down the vehicle in shortest distance during emergency

2. To control the vehicle speed while moving on plain roads and hills.

General automotive terminologies

The function of an Automobile is mainly dependent on its engine performance. The engine performance is determined by measuring various parameters related to its components. These parameters have definite terminologies and are measured in specific units. The following session covers all the important terminology – their units of measurement and the ideal way of calculating them.

Engine basic terminology

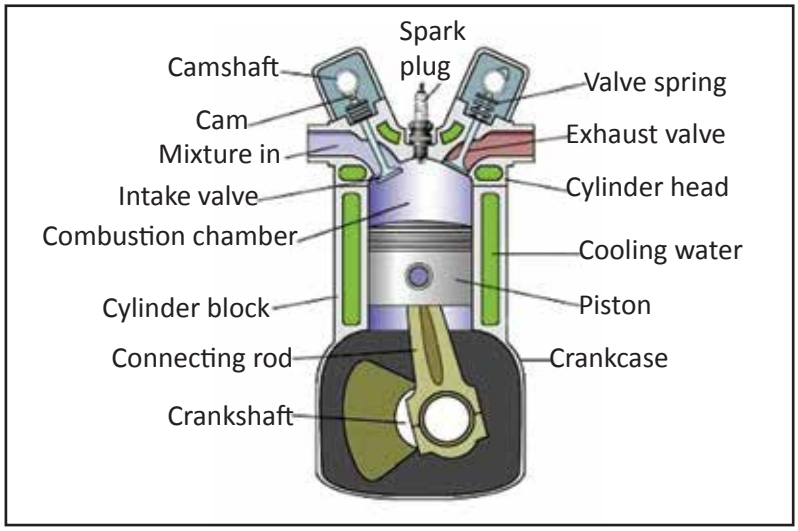


Fig: 2.3.2.22 Components of the Brake

Technical terms used In engine:

A number of basic terms are used to describe and compare engines. A few commonly used terms are described here.

- Top Dead Centre (T.D.C): Extreme position of the piston at the top of the cylinder is referred as TDC.
- Bottom Dead Centre (B.D.C): During the piston's lowest position further most position from the cylinder head, position of crankshaft is referred as BDC.
- Bore: Engine cylinder diameter is called as bore.
- Stroke: When the piston moves from TDC to BDC, the distance travelled by piston is referred to stroke
- Clearance Volume: Volume available above the piston, with the piston in top most position is referred as 'clearance volume' (Vc).
- Piston Displacement: The volume covered by piston while moving from TDC to BDC is called piston displacement, It is also referred as swept volume.
- Engine Capacity: It is the total displacement of piston or all the cylinders Swept volume
- Compression Ratio: The degree to which the charge in the engine is compressed is indicated by compression ratio. The calculation of compression ratio is based on volume above the pistons at BDC to the volume.
- Above the piston at T.D.C. If 'y' is the compression ratio, then $Y = \frac{Vs + Vc}{Vc}$

- For petrol engines, compression ratios are about 8 to 9.5 : 1, whereas for diesel engines, these vary from 16 to 22.
- Power: It is the work done in a given period of time. Doing the same amount of work in a lesser time would require more power.
- Horse Power (H.P.): This is the amount of energy required to do 4500kgm. of work in one minute. Indicated Horse Power (I.H.P): The power developed within the engine cylinders is called
- indicated horse power. This is calculated from the area of the engine indicator diagram.
- Brake Horse Power (B.H.P): This is the actual power delivered at the crankshaft. It is obtained by deducting various power losses in the engine from the indicated horse power.
- Friction Horse Power (F.H.P.): This is the power lost due to friction present between different matching components.
-

F.H.P = I.H.P – B.H.P

Engine Torque: It is the force of rotation acting about the crankshaft axis at any given instant of time. It is expressed in Newton - meter (Nm).

Important terms related to an engine

1. Torque- Is the turning force required to turn or twist any object

   For example, the effort that is required to tighten bolt with a spanner is called torque.

   Torque is measured in Nm (Newton meter)

   Torque = Force x Radial Distance

2. Engine Torque- Is the turning or twisting force developed by engine at the crankshaft

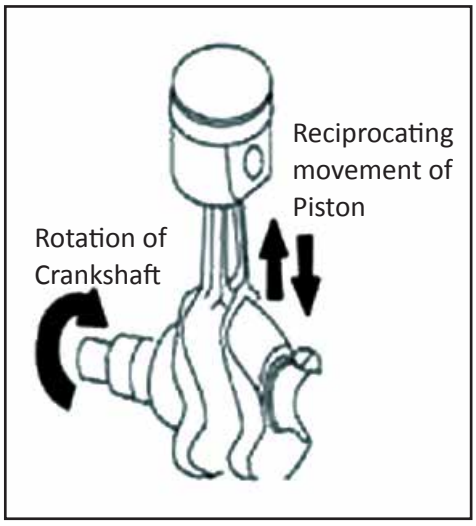


Fig: 2.3.2.23 Important Terms Related to Engine

Domain knowledge

- Handling of different software applications more effectively in the auto sector.
- Knowledge on technology will be helpful to operate latest tools and equipments and other measuring instruments.

Diagnostic methods can be followed through the technology.

2.3.3: Components of an Automobile

Engine:

- Function of the engine is to produce power
- The entire process of burning the fuel and generating power in the engine is completed in 4 steps or 4 strokes which gives it a name of 4-stroke engine
- Travel of piston from TDC to BDC or from BDC to TDC is called stroke.

Fig: 2.3.3.1 An Automobile Engine

Transmission (Gear box):

In-between the engine and the driving wheels the device used to change speed and torque is called Gear-box. Job of gearbox in the transmission system is as follows:

1. It exchanges engine power with higher torque and thus provides a mechanical advantage to drive the vehicle under different conditions.
2. It exchanges forward motion for reverse motion.
3. It provides a neutral position to prevent flow of power to the rest of power train.

Clutch:

The mechanism through which rotary motion of one shaft is transmitted to another device as and when desired to transfer the torque.

It is a mechanism which facilitates one shaft rotary motion to be transmitted to another shaft as and when desired.

Fig: 2.3.3.2 Clutch Assembly

Steering system:

Clutch is a mechanism which enables the rotary motion of one shaft to be transmitted, when desired.

- Steering system is an important mechanism in vehicle and is used by driver to have direction control on the vehicle
- This is achieved by turning the front wheels in desired direction by the driver

Brake system:

Brake system is used:

- To reduce vehicle speed quickly while driving
- To stop vehicle when needed
- To hold the wheels on slopes
- Brake system consists of various components like mechanical, hydraulic and electronic

Suspension system:

1. Suspension system includes various components such as combination of springs, shock absorbers and linkages, which connects a vehicle body to its wheels.

2. Suspension system improves vehicle stability by providing better vehicle weight distribution and traction of wheels with road surface, in conditions such as:

- Sudden brakes operation
- Sudden acceleration
- Driving on rough surfaces, i.e. bumps and potholes

Fig: 2.3.3.3 Suspension Sysytem

Air cooling system:

For the propulsion of vehicle, engines produce controlled explosions as the fuel is ignited by spark plugs. Enormous amount of heat is produced by these explosions, if these explosions are not under control, the engine may get damaged within a matter of minutes. Hence these high temperatures and explosions are controlled by a cooling system.

Work cycle:
Chart:

Charts of components of a vehicle should be observed carefully and note down the locations of various components

Identifying and Locating components of vehicle:

Identify and Locate the components of vehicle with the help of chart

2.3.4: Tool and Equipment

Fig: 2.3.4.1 Ball-Peen Hammers

Ball-Peen hammers:
The ball peen hammer is a type of peening hammer having 2 ends. Shape of the first end is like an ordinary hammer head while the other is ball shaped. It has a handle that is like that of a regular hammer and the material can vary, which includes wood, metal or fibreglass. This type of hammer is also called machinist's or engineer's hammer.

It is the tool that is utilized to form the general shape of the material in metal fabrication. It is also used for hitting chisels and punches.

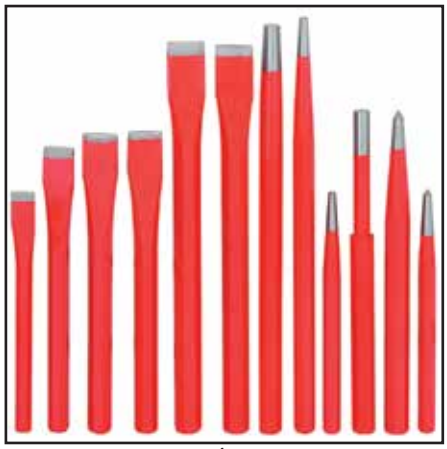


Fig: 2.3.4.2 Chisels/Punches

Chisels/Punches chisels:
Type of tool is having a typical shaped cutting of blade at one end used for carving or hard material cutting like wood, stone or even metal using hand and further struck with a mallet or mechanical power. In some chisel handle and blade are made up of metal or wood having a sharp edge. Chisels are various uses in service and maintenance.

Punches:
There are two distinct types of punches either hollow or solid one. Hollow punches are manly used puncturing surface to create a hole of metal sheet or leather. We can identify hollow punches by looking towards the working end where we can find its exit hole which helps in removing and discarding punch material. Shape and size of working edge can vary and depends on the hole required and the material being pierced.

Solid punches are made of metal and looks like a road, designed to be struck by a hammer. It is mainly used to move objects such as pins or to form impressions on a work piece. Solid punches can vary in diameter, length and tip depending on the job to be performed.

Fig: 2.3.4.3 Drill

Drill:
It is a tool which is getting attached with cutting tool or driving tool. It is basically used for boring holes in various types of materials or also in fastening various materials by the use of fasteners using a drill bit or drive bit.
Drills are mainly used for boring holes in wooden, metal job and also in construction and some basic requirement at home.
For drilling holes in various types of work like wooden, plastic or metal we use drilling machine. For safe drilling of such material bench drill is bolted down. There are also some larger versions of drill called pillar drill having longer column which help them to stand on the floor. It functions the same as the bench drill but can drill larger pieces of material.

Fig: 2.3.4.4 Drill-Bits

Drill-Bits:

Drill bits are cutting tools used to remove material to create holes, almost always of circular cross-section.

Drill bits are available in various shapes which can be used to create different types of hole in various types of materials. For making a hole, drill bits has to be attached with drill machine. Drill machine provide power to drill bits so that it can cut through the work piece by rotation. Upper end of the drill which is also called shank is grasped in the chuck.

Fig: 2.3.4.5 Hand-Sledge

Hand-Sledge:

In this type of tool a large flat metal head is attached to a handle which is also called lever. The advantage of sledge hammer is that its head size applies more force compare to other hammer of same size. It distributes force over a wide area along with mallet and basically the alternative of other types of hammer which apply force on relatively smaller area.

Basically sledge hammers are used in forging or metal works where heavy blow is required on the object. It is also used for placing large size gears, keys etc into its place by applying required force. We need to make sure to apply buffer in between so that parts should not get damage.

Fig: 2.3.4.6 Impact-Wrench

Impact-Wrench:

Impact wrench is also called by various names such as impact gun, air gun, rattle gun, torque gun etc. Impact wrench is a socket wrench power tool used to deliver high output torque with minimum effort by user as it stores the energy in rotating mass and deliver it suddenly to the output shaft.

Fig: 2.3.4.7 Hacksaw

Hacksaw:

A hacksaw is a metal-framed saw used primarily for cutting plastic and metal pipes and other small household materials. It is basically a U shaped bended frame which can hold a thin wide metallic blade between its clip having a handle at one end made up of plastic or wood. Some hacksaw is also having facility for adjustment so that it can accommodate wide variety and size of blades as per requirement. As per the requirement of cut the metallic blades will have varied number of teeth per inches like 14, 18, 24 or 32. For cutting smaller objects dense teeth will be required. There are two types of hacksaw blades namely high carbon steel blades and high speed steel blades used for various types of cutting job.

Fig: 2.3.4.8 Threader-Kit

Threader-Kit:

Theader - kit has a number of threading tools. It is use to threading the bolt.

If your threads are not completely destroyed, you can try "chasing" the threads with a thread chasing tap. This may realign the threads so that the bolt can be threaded in place. A thread chaser is essentially a slightly undersized tap that will clean threads without removing any metal.

When thread damage is too severe to be saved with a thread chaser, you can completely restore the threads with new coil-type thread inserts. They will provide a completely new threaded hole (with strong steel threads) that accepts the original size bolt. They are installed by drilling the damaged thread hole slightly oversize, tapping it with a larger tap, and screwing in the new thread insert coil.

Fig: 2.3.4.9 Pliers

Pliers:

The primary purpose of the tool known as pliers is to grip objects firmly. The objects can then be turned, bent, or otherwise manipulated. Pliers have parallel handles, a pivot where the handles join, and parallel jaws that grasp the object. Special-use pliers may have additional components and purposes, such as cutting pliers. Types of pliers include engineer's pliers for gripping metal, flat-nosed pliers for grasping smaller objects, electrician's pliers for gripping electrical wires, and round-nosed pliers for bending wire into loops. The most common are slip-joint and plumber's pliers, both with slip-joint adjustments to change the width of the jaw grip. In addition, locking pliers, sometimes known by the Vice-Grip brand name, are popular for firmly holding objects.

Fig: 2.3.4.10 Wrenches

Wrenches:

The objective of a wrench is to tighten or loosen bolt or nut. Based on fastener's design and size, appropriate wrench needs to be selected. It can also depend on how difficult the fastener is to reach.

Tip:- When using a wrench, pull it toward you rather than pushing it away as it provide better control and injury can be avoided during slip process.

Different types of wrenches are available: Box end, Open end, Combination, Adjustable, Socket and Allen.

Fig: 2.3.4.11 Screwdrivers

Screwdriver:

Screwdriver is manly used for tightening or losing screws by inserting it into the screw head. It helps in amplifying user's hand motion to its tip. There are various types of screwdriver tips based on specific requirement out which two most common head of screwdriver are straight or minus one and x shaped which is also called start tip. Handle of screwdriver made up of either plastic or wooden. For having better grip on handle rubber cover is also used on it. Some other tips are also used for various purposes like hourglass shape, square shape, six slots tips etc.

Fig: 2.3.4.12 Socket-Set

Socket-Set:

Socket set is having a number of different size detachable sockets used with socket wrench. It is basically a type of wrench having facility to attach a required size of socket at the end to turn a fastener. The most common type of socket wrench is ratcheting socket wrench which is also called ratchet.

Fig: 2.3.4.13 Soldering-Iron

Soldering-Iron:

Soldering iron is a handheld tool used for soldering purpose. It melts the solder by applying heat so that solder can flow in-between joints of two work piece so that it can be joined.

A soldering iron consists of metal tip having heating facility and insulated handle. Metal tip heating is done by the use of electric current which is supplied using and electric cable through the heating element.

Soldering irons are mainly used in electronics assembly during installation and repair work.

Fig: 2.3.4.14 Torque-Wrench

Torque-Wrench:

It is a tool which is used to exactly apply specific torque to a fastener like nut or bolts. Basically it is a socket wrench having special internal mechanism.

Torque wrench is a tool with high accuracy and used to measure the force applied while tightening a fastener. It gives a signal to the user either in the form of visual or audio when user reached to torque force to stop the pressure. This prevents over tightening a bolt, which can cause damage to the fastener, or under tightening, which can result in potential weakness to the item you are attaching or assembling.

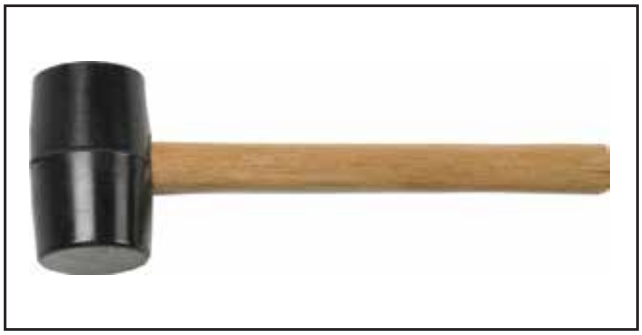


Fig: 2.3.4.15 Rubber-Mallet

Rubber-Mallet:

Rubber mallets are much lighter and cheaper than metal mallets and are much safer to use. A rubber mallet is the basically used to produce the effect of hitting on another object.

Sometime it is also used metal dent removal process because they don't leave any marks. They are also used in construction to force tight fitting parts together.

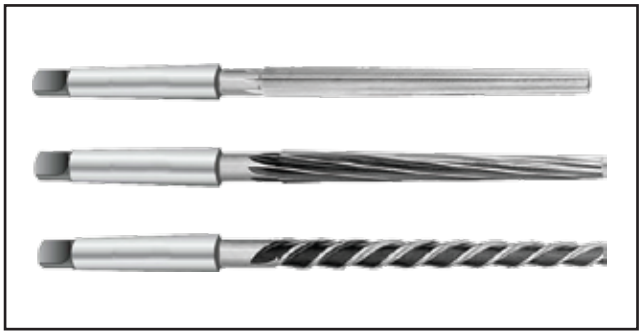


Fig: 2.3.4.16 Reamers

Reamers:

It is a type of rotating cutting tool used in metal work. It is designed to enlarge pre-existing hole dimension or further deepening by a small amount but with very high level of accuracy.

Various types of reamers are available based on material used, style of flute styles and size.

The typical reamer is a rotary cutting tools designed to machine a previously formed hole to an exact diameter with a smooth finish. But other types are used to remove burrs from the inside of pipes & drilled holes and to enlarge and align holes for fasteners.

Fig: 2.3.4.17 Soldering-Gun

Soldering gun:

Soldering gun is tool which work on electricity. It is used for metal soldering by using tin-based material so that strong mechanical bond with good electrical contact can be achieved. Shape of soldering gun is similar to the shape of pistol.

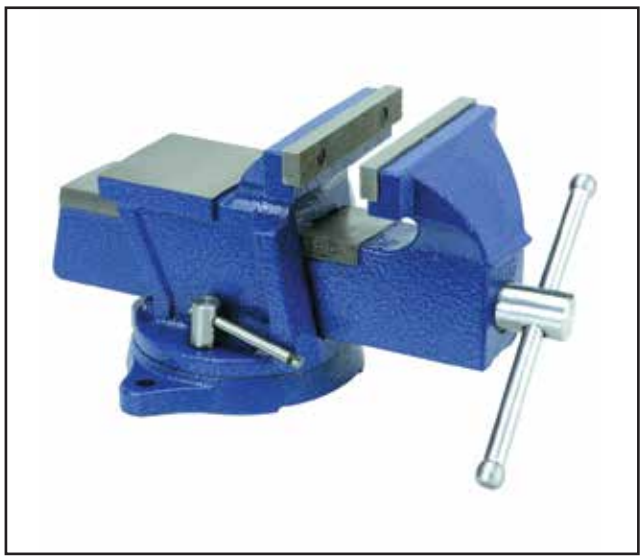


Fig: 2.3.4.18 Vise

Vise:

A vise or vice is a apparatus used to hold an object so that required work can be carried out on object. Vice consists of parallel jaws. One of the jaws is fixed on the structure whereas another one is movable having a liver to move the jaws.

Vises can be used to hold metal in place to be cut or modified.

Fig: 2.3.4.19 Extension Bar-Set

Extension bar-set:

It has number of bars in sets. Use extension bars to prevent over-tightening of lug nuts, distortion of wheels, drums and rotors. It helps to reach the bolt that are out of reach, so it make easier for mechanic to take off the part deep in engine bay.

2.3.4.1: Measuring Tools

Fig: 2.3.4.1.1 Micrometers

Micrometers:

Micrometer is basically a measuring tool used to measure block thickness, depth of slot, inner and outer diameter of shaft with high level of accuracy.

Fig: 2.3.4.1.2 Calipers

Calipers:

Caliper is a measuring tool used to measure the distance between two opposite sides of an object. It is as simple as compass with inward and outward facing points.

Fig: 2.3.4.1.3 Dividers

Dividers:

Divider is a measuring tool used primarily to measure distance particularly in maps. It is very similar to drawing compass except that compass is having one metallic point and one pencils where as divider is having two metallic points.

Fig: 2.3.4.1.4 Dial Indicator

Dial indicator:

Dial indicator is mainly used in monitoring the readings as it helps in displaying small measurement changes in amplified form. The gradations measured with a dial indicator are small, typically 0.001 inch to 0.100 inch.

Dial indicator helps in checking the difference in tolerance thus very helpful in the process of inspection of mechanical part, measuring beam deflection or also in various other situations where a small measurement needs to be recorded. It can measure ranges from 0.25mm to 300mm with graduations of 0.001mm to 0.01mm or 0.0005 inch to 0.001 inch.

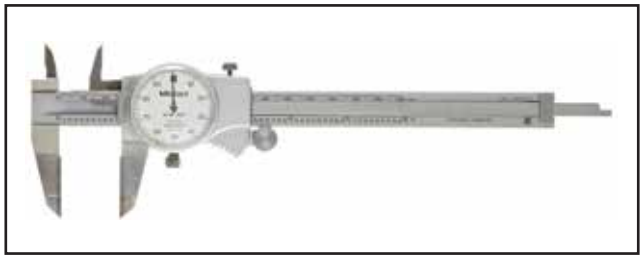


Fig: 2.3.4.1.5 Dial Calipers

Dial calipers:

Dial calipers can be used for four different types of measurement namely outside, inside, depth and step measurement. It is having large black numbers which is easy to read and can be adjusted from zero or immediate settings with thumb screw to lock the precise settings.

Fig: 2.3.4.1.6 Exhaust-Gas-Analyzer

Exhaust-Gas-analyzer:

Vehicle's exhaust is having various chemicals and to measure the amount of chemical exhaust gas analyzer is use. To measure the fuel-air ratio of the fuel mixture of an engine a carbon dioxide sensitive element device is placed in the exhaust manifold. It is also known as fuel-mixture indicator or smoke feeler.

Fig: 2.3.4.1.7 Scan-Tool

Scan-Tool:

Scan tool used in automotive is often called as scanner. This is basically an electronic tool which can be interfaced with vehicle for diagnostic purpose. It also helps to reprogram control module of vehicle.

Fig: 2.3.4.1.8 Oscilloscope

Oscilloscope:
The oscilloscope helps us find the problem quicker and easier. Shows the electrical activity in the vehicles ignition system and other electrical systems.

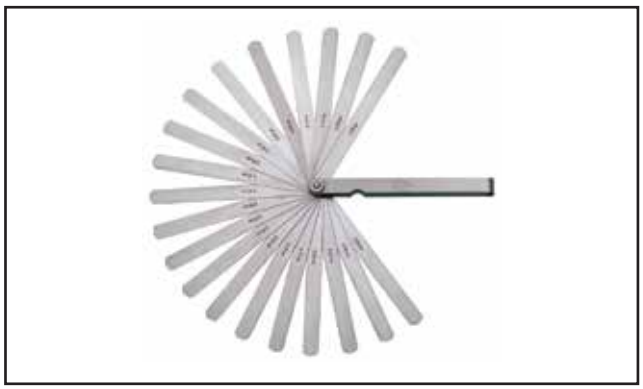


Fig: 2.3.4.1.9 Feeler-Gauge

Feeler-gauge:
A feeler gauge is a tool used to measure gap widths. Feeler gauges are mostly used to measure the clearance between two parts. They consist of a number of small lengths of steel of different thicknesses with measurements marked on each piece.

Fig: 2.3.4.1.10 Gauge

Gauge:
Gauge is a measuring tool used for measurement to display certain information like time. Based on the use of gauge it can be generally defined as a physical quantity measuring device for example deciding the thickness, space gap, material diameter or flow pressure.

Fig: 2.3.4.1.11 Test Light

Test light:
Test light is electronic test equipment also known as test lamp, voltage tester. It is basically used for establishing the presence or absence of alternating current in a piece of equipment under test condition.

Fig: 2.3.4.1.12 Voltmeter

Voltmeter:

Voltmeter is a measuring instrument used to measure potential difference or voltage between two points in either electrical or electronic circuit. It is often called voltage meter. There are two types of voltmeter i.e. analog which is using needle type of pointer to show the reading whereas another type is digital which shows reading as numerical display.

A voltmeter in a circuit diagram is represented by the letter V in a circle.

Fig: 2.3.4.1.13 Multimeter

Multimeter:

Multimeter is a electronic measuring instrument which is also called as multi tester. It is equipped with the facility of measuring several functions within one unit.

Multimeter is a hand held device used to measure current, voltage both type AC and DC and resistance with high degree of accuracy and mainly used for fault finding during maintenance and service process. It is very helpful in electrical or electronic problem troubleshooting in a wide range of industrial and household devices such as electronic equipment, domestic appliances, power supplies and wiring systems.

Fig: 2.3.4.1.14 Tachometer

Tachometer:

Tachometer is a measuring tool used to measure rotation speed of instrument shaft or disk in a motor or other such machine.

2.3.5: Engine Basic

An engine is a most important mechanical device used in automobiles.
There are some basic engine terminologies is that helps describle the function of an engine.

All automobile engines are Internal combustion engines. These are classified mainly according to;

- Arrangement of Cylinders
- Type of fuel used
- Number of Strokes per cycle (Two Stroke & Four stroke)
- Number of Cylinders
- Method of Ignition (Spark Ignition (SI) & Compression Ignition (CI)

Fig: 2.3.5.1 Engine of a Two Wheeler

Classification of three wheeler engine:

1. Petrol engine
2. LPG/ CNG engine
3. Diesel engine

Based on number of strokes per cycle

- Two stroke
- Four stroke

Two stroke engines - Those engines which gives the power at every second stroke of the piston

Fig: 2.3.5.2 Two Stroke Engine

Two stroke engine cycles:

1st Stroke – BDC to TDC – Suction & Compression
As the piston moves upwards, air/fuel mixture enters the crankcase through the inlet port.
At the same time air/fuel mixture is compressed in the combustion chamber and ignited by spark plug.

2nd stroke – TDC to BDC – power & exhaust:

As the air/fuel mixture gets ignited, combustion takes place which gives power and as a result the piston moves downwards and is called power stroke.
At the same time, Inlet port gets closed and the air/fuel mixture in the crankcase is compressed and is forced in to the combustion chamber through transfer port. Which in turn put the exhaust gases out of combustion chamber and fills the chamber with a new charge.

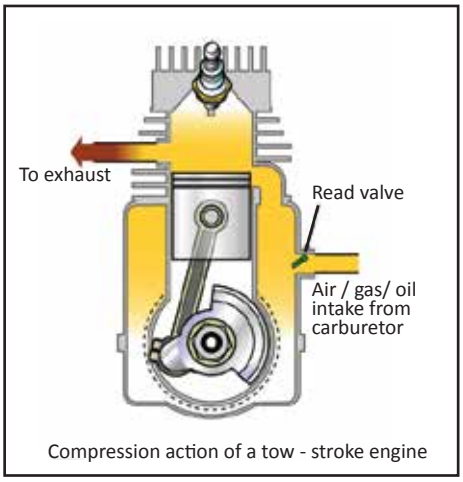


Fig: 2.3.5.3 Two Stroke Engine

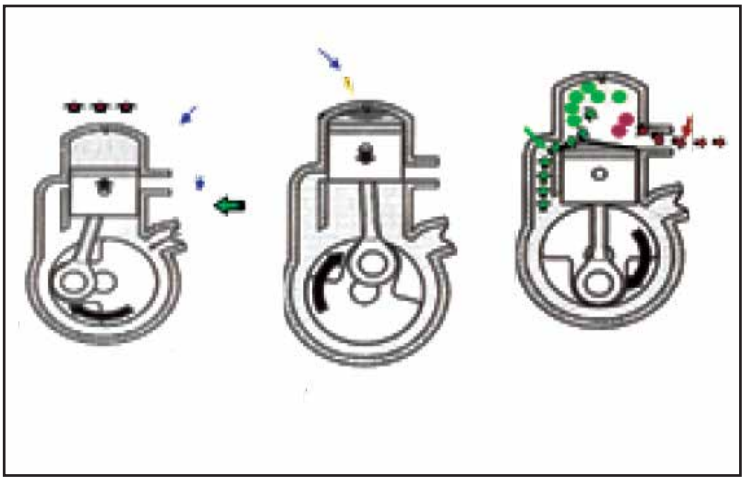


Fig: 2.3.5.4 Working of a Two Stroke Engine

Four stroke engines:

These engines gives one power stroke in every two revolutions of crankshaft
Four strokes of the engine are:

1) Intake Stroke
2) Compression Stroke
3) Power Stroke
4) Exhaust Stroke

Four strokes of the engine are explained as follows:

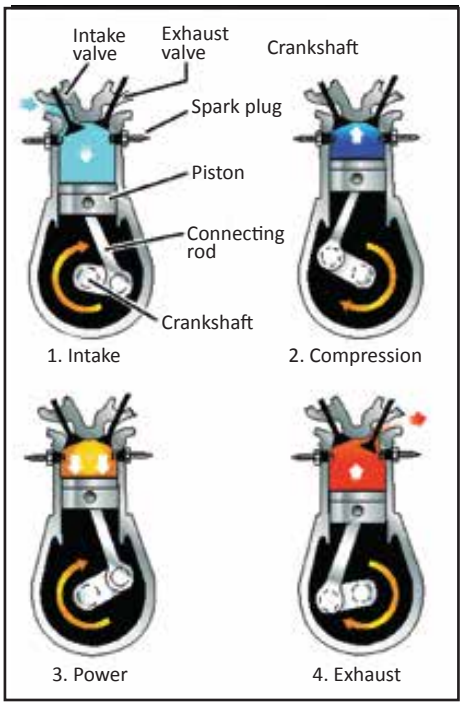


Fig: 2.3.5.5 Four Stroke Engine

1 - Intake stroke:

In intake stroke movement of piston is from TDS to BDC in downward direction for taking the mixture of air and fuel inside the cylinder through inlet valve. In intake stroke condition inlet valve is stay in open condition and exhaust valve stay in close condition.

2 - Compression stroke:

In this stroke, The piston moves upwards from BDC to TDC compressing the air fuel mixture. In this condition both inlet and exhaust valves remains closed as and when the piston near the TDC, spark plug ignites as a result combustion takes place.

3 - Power stroke:

In this stroke, due to combustion the Piston Moves downwards from TDC to BDC giving the power to the crankshaft in this condition both inlet and exhaust valves remains closed.

4 - Exhaust stroke:

In exhaust stroke condition inlet valve is stay in closed condition and exhaust valve stay in open condition.

Two stroke engines	Four stroke engines
It gives power in every revolution of crankshaft	It gives power in every two revolution of crankshaft
Valve less construction , due to which it is lighter and cheaper	It is having valves in he construction so heavier compared to 2 stroke engines
Less volumetric efficiency	More Volumetric efficiency
Cooling is difficult so it may result in overheating	Cooling of the engine is easier
Lubrication system is simpler	Lubrication system is complex

Tab: 2.3.5 Comparison two and four stroke engine

2.3.5.1: Function of Engine

Function of the engine is to produce power:

- The entire process of burning the fuel and generating power in the engine is completed in 4 steps or 4 strokes which gives it a name of 4-stroke engine

- Piston travel from top dead centre to bottom dead centre or bottom dead centre to top dead centre is called stroke

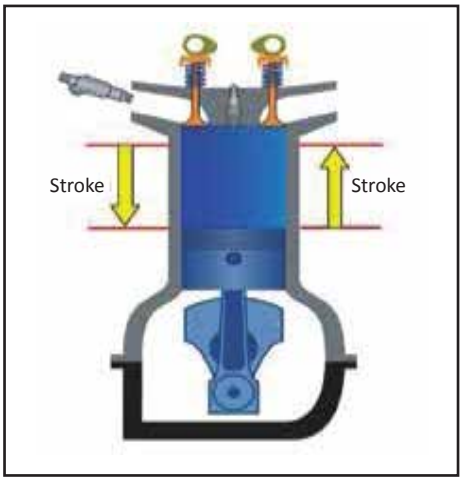


Fig: 2.3.5.1.1 Four Stroke Engine

Four stroke petrol engine:

Four stroke petrol engine is an example of internal combustion engine in which the piston completes four separate strokes namely

- Suction/Intake stroke
- Compression stroke
- Power/Expansion stroke
- Exhaust stroke
- Suction/Intake strok

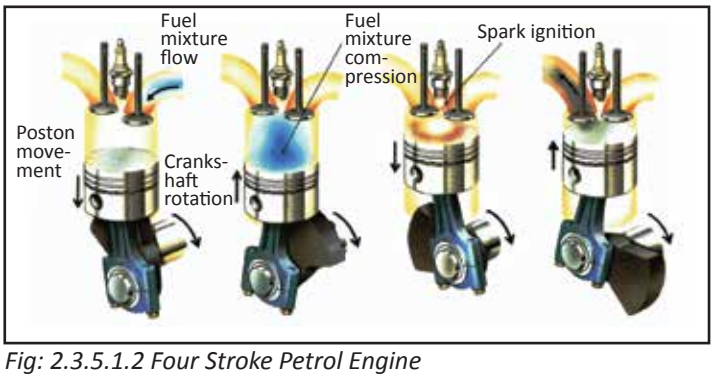


Fig: 2.3.5.1.2 Four Stroke Petrol Engine

Suction/Intake stroke:

- Air and fuel mixture enters the cylinder.
- The intake valve is open and exhaust valve is closed.

Compression stroke:

- In this stroke the air and fuel mixture in the cylinder is compressed.
- During this stroke both inlet and outlet valves are closed.

Power/Expansion stroke:

- Sparkplug generates a spark which causes the air-fuel mixture to combust.
- During this stroke both the inlet and outlet valve are closed.

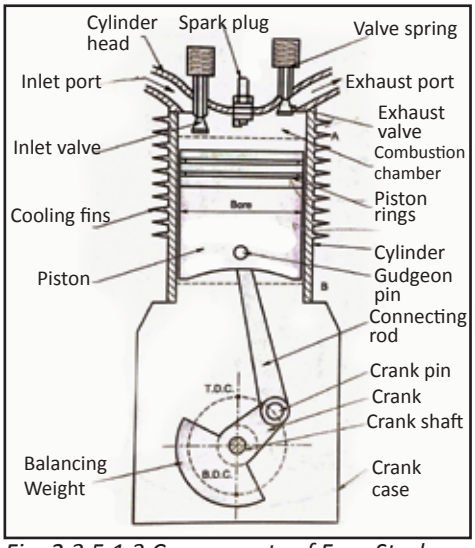


Fig: 2.3.5.1.3 Components of Four Stroke Petrol Engine

Exhaust stroke:

- Burnt gases are then pushed out from the cylinder.
- During this stroke inlet valve is closed and outlet valve is open.

Four stroke diesel engine is an example of internal combustion engine in which the piston completes:

- Suction/Intake stroke
- Compression stroke
- Power/Expansion stroke
- Exhaust stroke

Suction/Intake stroke:

- Only air enters the cylinder.
- The intake valve is open and exhaust valve is closed.

Compression stroke:

- Air is compressed in compression stroke resulting of increased temperature and pressure.
- During this stroke both the inlet and outlet valves are closed.

Power/Expansion stroke:

- Diesel is injected which ignites due to high pressure.
- During this stroke both the inlet and outlet valves are closed.

Exhaust stroke:

- Burnt gases are then pushed out from the cylinder.
- During this stroke inlet valve is closed and outlet valve is open

2.3.5.2: Engine Dismantling & assembly Process

Sub Titles	Description
Engine dismantling	Steps involved during dismantling of engine 1. Drain the oil 2. Remove Subassemblies like generator, starter motor, oil filter and engine flywheel. 3. Remove Cylinder head cover, rocker-shaft assembly and push rods. 4. Remove manifolds. 5. Pull off high pressure fuel lines. 6. Remove all studs in the cylinder block cylinder head. 7. Place the engine in upside down position 8. Remove oil sump 9. Remove oil strainer and oil pump. 10. Remove connecting rod caps and take is out from their place. 11. Remove pistons and connecting rods from topside of cylinder bore
Engine assembly	Steps involved during assembly of engine 1. Clean all the mating faces and reusable parts thoroughly and check them for damage. 2. Fit the crankshaft 3. Install the pistons and lubricate 4. Fit the bearing caps 5. Install the crankshaft pilot bearing 6. Install the rear oil seal housing 7. Align the oil seal housing 8. Fit the crankshaft rear oil seal 9. Fit the crankshaft oil seal housing 10. Fit the oil baffle 11. Fit the oil strainer 12. Apply sealing compound to the cylinder block on the flywheel side. 13. Fit the sump using a new gasket 14. Align the sump 15. Fit the flywheel 16. Centre the clutch disc on the pressure plate 17. Fit the clutch assembly 18. Clean and reassemble the oil pump 19. Fit the oil pump using a new gasket 20. Fit the cylinder head and tighten the bolts 21. Tighten the cylinder head bolts 22. Tighten the auxiliary cylinder head bolts

Engine assembly	23. Install the camshafts 24. Fit the timing chain 25. Install the oil pump assembly 26. Fit the lower timing chain cover 27. Fit the crankshaft vibration damper 28. Fit the cylinder head cover with a new gasket 29. Attach the engine mounting bracket 30. Fit the oil filter 31. Fit the alternator and bracket 32. Fit the inlet manifold bracket 33. Fit the EGR system 34. Install the brackets for the air conditioning compressor and the exhaust 35. Detach the engine from the assembly stand 36. Attach the engine mounting bracket with the engine mounting. 37. Finally fill up with engine oil

Tab: 2.3.5.2 Engine Dismantling and Assembly

2.3.5.3: Engine and Air Induction System

Atmospheric air contains oxygen content in it and since oxygen facilitates burning it needs to be supplied to the engine cylinder. The channel through air or air/fuel mixture enters the engine cylinder is called the air induction system.

It consists of various components mechanical/electrical to measure and control the quantity and quality of the air entering the engine cylinder, each component has it unique way of operation.

Intake system fundamentals:

Engine is contaminated by these two sources:

- Contaminants generated internally
- Entry of dirt through air intake system

Generally following types of filters are used

- Dry paper filter – It is manufactured from pleated paper
- Oil wetted polyurethane

Air filters are rated for - Efficiency, flow, and capacity

Mainfolds:

Engine breathing system is suing two types of manifolds

- Intake manifold
- Exhaust manifold

It is designed to provide consistent air and fuel mixture to cylinders and must have proper size and design

Intake mainfolds:

- Runners
- Port injection manifolds
- Plenum
- Siamese runners
- Dual-plane manifold
- Single-plane manifold
- Port-injected engines
- Passages in an intake manifold
- Look different
- Air space below a throttle body or carburetor
- Feed two neighboring cylinders
- Each barrel is independent
- Both barrels serve all eight cylinders
- No intake manifold heating on

Fig: 2.3.5.3.1 Air cleaner/Filters

Fig: 2.3.5.3.2 Air Filter System

2.3.5.4: Engine Compression Pressure Checking

A compression gauge or compression tester is a tool inserted into the spark plug hole on an engine while the flywheel is rotated. This will result in a pressure reading that can be used to judge the condition of a cylinder, piston, and rings. For a discussion on the ill-effects of certain compression testers being used on small displacement engines.

Fig: 2.3.5.4.1 A Compression Gauge

Fig: 2.3.5.4.2 Checking the Gauge

2.3.5.5: Compression Test

Title of the sub-task	Description
Compression test	1. Switch on ignition key & start the engine. 2. Ensure the engine temperature should be 60º C & then switch off the ignition key. 3. Disconnect the left hand side 'spark plug cap' & remove the spark plug. Also disconnect spark plug cap from right hand side spark plug. Confirm ignition switch is in 'OFF' condition. 4. Thread in adaptor and fix compression pressure gauge in cylinder head plug hole for left hand side spark plug. 5. Give full throttle & apply 5 to 6 sharp kicks. 6. In case of vehicle is without kick, press self start button 5 to 6 times. 7. Note the engine compression pressure reading on the pressure gauge. 8. To compare the compression pressure refer vehicle specification chart as given below. 9. If engine compression pressure reading in dry compression test is less than specified, carry-out 'wet compression test'. 10. In wet compression test, pour few drops of engine oil through plug hole in cylinder head. 11. Give full throttle & apply 5 to 6 sharp kicks. In case of vehicle without kick, press self start button 5 to 6 times. 12. Note the engine compression pressure reading on the pressure gauge. 13. If wet compression pressure reading is considerably greater than dry compression pressure reading, this means the problem area is block piston. 14. If wet compression pressure reading is same as dry compression pressure reading, this means the problem area is cylinder head.

Tab: 2.3.5.5 Engine Compression Test

2.3.5.6: Engine Evaporative Emission Control System

The Evaporative Emission Control System (EVAP) is basically designed such a way that from fuel tank or fuel system gasoline vapours can be prevented from escaping into atmosphere.

The EVAP helps in preventing fuel vapour production in sealed tank. The fuel vapour which is build up is getting trapped in the sealed tank and are expelled from the sealed tank using vapour valve assembly which is mounted on top of the tank. The vapors leave the valve assembly through a single vapor line and continue to the EVAP canister for storage until the vapours are purged to the engine for burning.

Evaporative Emission (EVAP) systems are of four types:

- There are four types of Evaporative Emission (EVAP) systems:
- The Evaporative Emission (EVAP) Purge Flow system.
- The Vapour Management Flow system.
- The Evaporative Emission (EVAP) Running Loss system.
- The On-Board Refuelling Vapour Recovery (ORVR) Evaporative Emission (EVAP) system.

How the evaporative emission control system works?

Sealing a fuel tank is never been a good solution as it does not sound to be applicable. Fuel tank should have venting facility to fill the gap of oil by air as fuel pump suck the fuel and send it to engine for combustion. If we seal the tank tightly negative suction pressure inside the tank will be created by fuel pump which may lead collapse of tank. Some EVAP systems are using spring-loaded valve inside the gas cap to vent the tank. On newer vehicles, it is vented through the EVAP canister.

Classification of three wheeler engines:

The major components of the evaporative emission control system include:

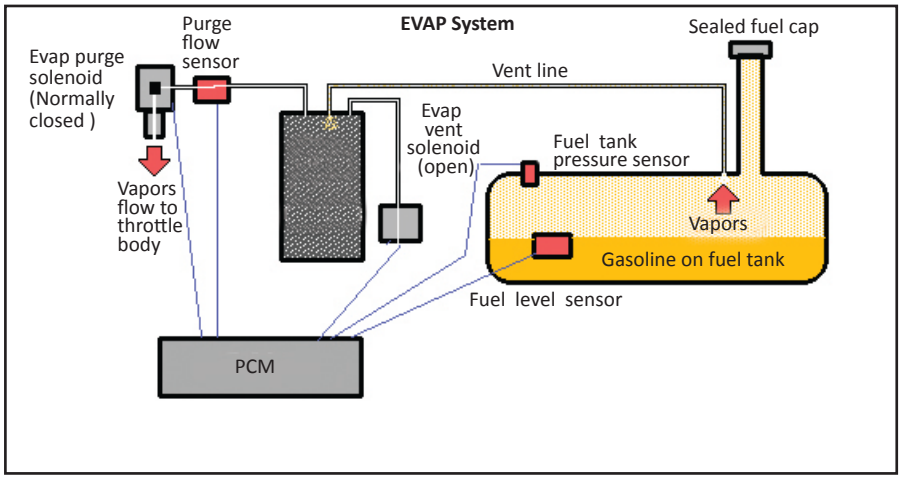


Fig: 2.3.5.6.1 Components of the EVAP System

Fuel tank:

It is designed in such a way that it has some space for expansion at the top level so that when due to heat fuel can expanded without overflowing or forcing the EVAP system to leak.

Gas cap:

Which usually contains some type of pressure/vacuum relief valve for venting on older vehicles (pre-OBD II), but is sealed completely (no vents) on newer vehicles (1996 & newer). NOTE: If you are replacing a gas cap, it MUST be the same type as the original (vented or no vented).

Liquid-vapor separator:

It is situated on fuel tank top portion or could be an integral part of the expansion overflow tank. EVAP canister is protected from liquid gasoline entry into the vent line using this device as it is extremely important that gasoline should not go directly to EVAP canister because it will hamper the ability of canister in storing fuel vapors. Thus we can say that liquid vapor separator will not give any trouble in long run. But it can still develop problem; if fuel tank debris is blocking liquid return; if main vent line is blocked; or due to development of external leak due to any reasons such as vibration, rust or corrosion.

Some liquid-vapor separators use a slightly different approach to keeping liquid fuel out of the canister vent line. A float and needle assembly is mounted inside the separator. If liquid enters the unit, the float rises and seats the needle valve to close the tank vent.

Foam-filled dome is one of the alternative solutions which can be used in the fuel tank top portion as it will the vapour to pass through foam where as liquid will blocked and drop back.

During a blockage in the liquid vapour separator or in vent line between liquid vapour separator and EVAP canister, fuel tank cannot breathe appropriately. Symptoms include fuel starvation or a collapsed fuel tank on vehicles with solid-type gas caps. If whoosh of pressure is noticed within the tank when the gas cap is removed it may be due to poor venting. Tanks venting can be checked by simply removing gas cap and then after disconnecting the gas tank vent line from the EVAP canister. The best method is to blow the vent line into the fuel tank, if the system is free and clear you will be able to blow it out. Sometime blowing with compressed air can also remove the blockage. If the problem still persists vent line needs to be inspected thoroughly and may also remove the fuel tank for problem diagnosis.

EVAP canister:

EVAP canister is made up of either plastic or steel having round or rectangular shape mounted on the vehicle. It is usually hidden from view and may be located in a corner of the engine compartment or inside a rear quarter panel. The canister is filled with about a pound or two of activated charcoal. The charcoal acts like a sponge and absorbs and stores fuel vapors. The vapors are stored in the canister until the engine is started, is warm and is being driven. The PCM then opens the Canister purge valve.

Fig: 2.3.5.6.2 EVAP Canister

Canister purge valve:

Canister purge valve allows intake vacuum to drain off the fuel vapours into the engine. A canister made up of charcoal is connected to the fuel tank through tank vent line. Few problems have been observed in normal situation in EVAP canister. As the charcoal is having very high life thus it will be working throughout vehicle life. The problem occurs in EVAP canister is mainly due to faulty purge control or vent solenoid. We can test the vacuum type purge valve using a hand held vacuum pump by applying vacuum in to the purge valve. If it is in good condition it should open without leaking vacuum. IN solenoid type purge valves to check whether it is opening or not voltage is applied. We can also use ohmmeter to check the resistance of solenoid to make sure it is open or shorted.

The purge control strategy on many late model EVAP systems can get rather complicated, so the best advice here is to look up the EVAP diagnostic procedures in the OEM service literature.

Fig: 2.3.5.6.3 Canister Pump Valve

Purge valve problems:

The most common problem with the purge valve is when it sticks or does not close fully. This may cause the “Check Engine” warning light to come on. In some cars, a stuck-open purge valve can cause difficulty starting right after refueling at a gas station: for the first few seconds the engine may run rough and stumble. Purge valve problems are common in many vehicles. In some early-2000’s vehicle a stuck-open purge valve is fairly common to cause the “Check Engine” light with the code P0441. Similar problems are fairly common in many European cars including Audi and Volkswagen The purge valve is inexpensive and replacement process is also very simple..

Fig: 2.3.5.6.4 Testing the Solenoid

Fig: 2.3.5.6.5 Applying Battery Voltage

How the purge valve (solenoid) is tested?

You can find the proper procedure to test the purge valve in the vehicle’s service manual. The procedure is different depending on the car make and model. In most cars, the purge valve is normally closed, meaning it should be closed with no voltage and open when the voltage is applied.

The service manual of many vehicles recommends applying battery voltage to purge valve terminals to observe and audible click sound. This can be achieved by suing a 9 volt battery. In case purge valve not producing audible sound follow the next step.

As per manual the next step is to test out whether purge valve is closing properly without any leakage. To perform this process apply vacuum to the purge valve from vacuum pump.

If the vacuum drops immediately it means purge valve doesn't seal properly thus we need to replaced it. This car had a "Check Engine" light on the dash. We had it scanned and got the code P0446 - Evaporative Emis-sion Control System Vent Control Circuit Malfunction. We tested the EVAP system and found that it had a slow leak. Now we found the culprit!

To illustrate the difference, we tested the purge valve from a different car. It holds the vacuum very well, even after one minute the vacuum hasn't dropped.

Now we connect the battery voltage. The purge valve clicks and the vacuum immediately drops. This purge valve is good.

Fig: 2.3.5.6.6 Testing the EVAP System

Checking for leaks:

several checks into the system. For instance, when the fuel cap is left off, or we do not tighten it enough, we create a leak. To test for this, engineers use different systems. With the vacuum evaporative emissions system, the computer can command the vent solenoid to close. The PCM then opens the purge solenoid and the tank pressure is monitored by tank pressure sensor. In a given time if the pressure does not drop to a vacuum, it assumes a leak is present and turns the check engine light on. Other systems may use pres-sure, generated by on onboard pump to test the system.

These systems can also judge the size of the leak. If it cannot establish a vacuum or hold pressure, they assume a gross leak. Large leaks set codes like P0440 and P0455. When we can establish a vacuum or pres-sure, but the system is unable to maintain it for a given period, the PCM shows a small leak. Such a situation may set code P0442. Like all diagnostic trouble codes, the codes provide a starting point and NOT an actual diagnosis of the problem.

A failed pressure sensor, broken vacuum line, bad vent, a failed purge solenoid, bad engine computer or several other things can set the same DTC. Trained technicians start with the code and test components to isolate the actual cause of the problem.

Emission norms in India:

With more and more vehicles coming on the roads there is possibility of large scale pollution caused but these vehicles. However, if vehicles are designed and maintained as per regulations then this danger will be reduced considerably.

The first stage of emission norms for petrol vehicles came into force in the year 1991 where as for diesel vehicle it was enforced in the year 1992. Catalytic converter fitment became mandatory in April 1995 and all new cars in four metro city of India namely Delhi, Mumbai, Kolkata and Chennai were sold with this facility which also boosted the supply of unleaded petrol(ULP). During the same period ULP availability was extended to another 42 major cities and as a result presently it is available across the country.

The emission reduction achieved from pre-1989 levels is over 85% for petrol driven and 61% for diesel vehicles from 1991 levels.

In the year 2000 passenger cars and commercial vehicle in India was compliance with started meeting India 2000 norms which was equivalent to Euro I. Bharat Stage II norms which is equivalent to Euro II was enforced in all 4 metro cities of India from 2001.

India is still behind Euro norms by few years. These are standards followed by European countries. However, with many vehicles manufactured in India now being exported a beginning has been made, and emission norms are being aligned with Euro standards and vehicular technology is being accordingly upgraded. Indian Vehicle manufactures are also working towards bridging the gap between Euro standards and Indian emission norms.

Government of India regulated output of air pollutants from internal combustion engine equipments including motor vehicle through Bharat stage emission standards norms. Ministry of Environment & Forest formed central pollution control board an autonomous body to decide implementation time line and standard.

Now a days India has adopted Bharat stage –IV norms in automobile sector. For metro cities it has become compulsory to use standard product

2.3.5.7: Engine Oil & Oil Filter Replacement

To operate the vehicle in proper and safe condition oil must be periodically replaced at regular intervals Periodic maintenance results in following benefits

- Safe operation of the vehicle with minimum break-downs.
- Better performance vehicle such as power and fuel efficiency.
- Longer life of vehicle parts.
- Overall lesser maintenance and ownership cost.

Fig: 2.3.5.7 Testing the Emission

2.3.5.8: Engine Oil Replacement Process

Title of the sub-task	Description
Engine oil replacement	1. Ensure vehicle is thoroughly clean 2. Ensure the engine is in warm condition before opening engine oil drain bolt 3. Drain engine oil in a clean container 4. Measure the quantity of drained oil. 5. It is important to measure oil quantity after draining. This is important to understand the oil consumption pattern 6. Inspect oil quality. 7. Clean ferrous burr accumulated on the tip of magnetic drain plug and then refit 8. Tighten drain plug to recommended torque by torque wrench. 9. During the interval- from one oil change to the next oil change, engine oil consumption quantity should not be more than 50 ml. per 1000 Kms. If oil drop is more check for external oil leakage, smoky exhaust & piston ring wear. 10. Clean oil strainer as per SOP before filling new engine oil. 11. Replace paper oil filter(if applicable) by new one before filling new engine oil. 12. Clean centrifugal oil filter wherever applicable 13. Use genuine oil only as recommended by OEM 14. Ensure oil filler cap 'O' ring is in good condition 15. Ensure oil filler cap is fully tight.

Tab: 2.3.5.8 Engine Oil Replacement Procedure

2.3.5.9: Fuel Supply Components

Atmospheric air contains oxygen content in it and since oxygen facilitates burning it needs to be supplied to the engine cylinder. The channel through air or air/fuel mixture enters the engine cylinder is called the air induction system.

It consists of various components mechanical/electrical to measure and control the quantity and quality of the air entering the engine cylinder, each component has it unique way of operation.

Fuel System:

Fig: 2.3.5.9.1 Filter

Fig: 2.3.5.9.2 Carburetor

FUEL SUPPLY COMPONENTS FOR S.I. ENGINE	FUEL SUPPLY COMPONENTS FOR C.I. ENGINE
• Fuel tank • Fuel lines • Fuel pump (A.C. mechanical type or electrical type) • Fuel filter • Carburetor • Intake manifold • Air cleaner	• Fuel tank • Fuel lines • Fuel feed pump (Mechanical type or electrical type) • Fuel filters • Fuel injection pump (FIP) • Fuel injectors

Tab: 2.3.5.9.1 Fuel Supply Components

Types of Fuel Supply System:

Gravity System

In this system fuel flow into carburettor float chamber due to gravity because fuel tank is usually mounted at the highest position. This is known as the most simple and cost effective system but the disadvantage with this system is placing the fuel tank over the carburettor was convenient.

Pressure System: In the pressure system, a hermitically sealed fuel tank is used. Pressure is created in the tank by means of engine exhaust or a separate air pump. For starting, the pump is primed by hand. It is under the pressure thus produced, that, the fuel flows to the float chamber of the carburetor. There are chances of pressure leak, but, the advantage lies in the fact the fuel tank can be placed at any suitable location

- Vacuum System: This system is based upon the simple fact that the engine suction can be used for sucking fuel from the main tank to the auxiliary fuel tank from where it flows by gravity to the carbu retor float chamber.

- Pump System: This system is using steel pipe to carry petrol to the fuel pump. It pumps the fuel into the float chamber of the carburettor through a flexible pipe. There are two types of fuel pump mechanically operated and electrically operated. Mechanically operated fuel pump is placed on the engine as it has to be driven from engine crankshaft where as electrically operated fuel pump can be mounted at any convenient location away from heat to reduce forming of vapour lock.

- Fuel Injection System: Latest petrol engine (MPFI engines) vehicle is using petrol injection system. In this system carburettor is out of picture as we do not use it. The fuel delivered into an air stream using nozzle. Each cylinder is using separate fuel injection system which controls the mixture under differ ent load and speed conditions.

Engine Valve Timing & Valve Clearance:

In all four stroke engine and few two stroke engine timing of valve is controlled by the camshaft. Modifying the camshaft usually modify the timing. During engine operation due to variable valve timing it also get varied. It is also like to be affected by the valve mechanism adjustment, and particularly by the tappet clearance.

To measure the gap width we need a tool called feeler gauge. To measure the clearance between two parts we usually use feeler gauge.

They consist of a number of small lengths of steel of different thicknesses with measurements marked on each piece

Fig: 2.3.5.9.3 A Feeler Gauge

2.3.5.10: Valve Clearance & Timing

Title of the sub-task	Description
Valve Clearance	1. Do Valve Clearance setting at engine cold condition. 2. Open the generator cover & cylinder head cover. a. Ensure piston is at TDC position by aligning marking of rotor & crankcase. b. Ensure cam sprocket horizontal line marks should align with cylinder head surface 3. Caution: Timing chain sprocket should be rotated in clockwise direction only. 4. With help of filler gauge check valve clearance inlet / exhaust & adjust as per recommended specification 5. Filler gauge should have a mild resistance when being slide out after setting the valve clearance. 6. With help of special tool ensure proper locking of check nut of rocker arm screw. 7. Complete one rotation of engine & recheck the valve clearance. 8. Refit generator cover & cylinder head cover.
Valve timing	1. Rotate the crank shaft. 2. Bring the piston no one to TDC. 3. Rotate the cam shaft with the sprocket. 4. Install the chain on the crank shaft sprocket. 5. Fix the camshaft sprocket, along with the chain on the camshaft, align the bolt holes or dowel. 6. Check and align the timing marks on the sprocket. 7. Recheck the alignment of the timing marks by rotation. 8. Carry out a valve timing check, if necessary.

Tab: 2.3.5.10 Valve Clearance and Valve Timing

2.3.5.11: Engine Lubrication System

Lubrication system

An Automobile engine operates at very high speed and hence generated high heat. Also metal to metal contact generates friction. In order to reduce friction and temperature, a lubrication system is used in automobiles.

Purpose of lubrication system

- Lubricate- friction is reduced as it creates a thin film in-between moving parts (Bearings and journals)
- Seals- A gastight seal in-between piston rings and cylinder walls is formed by the oil. In case the oil is leaked inside we will observe a blue smoke at the exhaust pipe.
- Cleans- As the oil get circulated throughout inside the engine it pickup tiny metal substances and carbon particle and bring them back to the oil pan.
- Cools – While moving inside the engine it also picks up the heat and further drop it into the cooler oil pan thus helping in reducing heat.

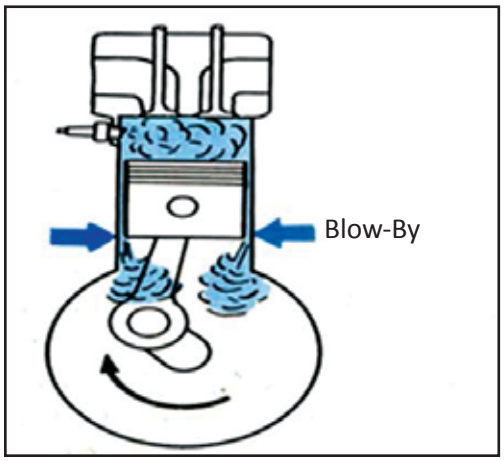


Fig: 2.3.5.11.1 Cooling

- Absorbs shock- During the heavy load which is imposed on the bearing it helps in cushioning the load also.
- Absorbs Contaminants - Oil additive feature help in contaminants absorption which might enter in the lubrication system.

Components of lubrication system

Oil pumps- It is basically driven by engine camshaft and crankshaft (Difficult to rebuild)

- Rotor Pump
- Gear oil Pump

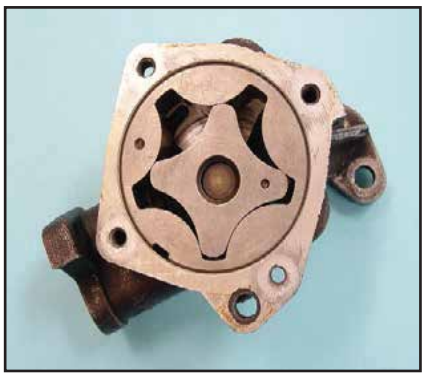


Fig: 2.3.5.11.2 Oil Pumps

Oil pan

It is used for storing oil in the vehicle and also helps in oil cooling process

Pressure Relief Valve to prevent the buildup of high Pressure (Causes the oil filter to bulge, but not a common problem)

Fig: 2.3.5.11.3 Oil Filter

Oil filter cutaway

Fig: 2.3.5.11.4 Oil Filter Cutaway

Fig: 2.3.5.11.5 Oil Filter

Positive crankcase ventilation valve

- Pollution prevention
- Blow-by back into the intake
- Prevent sludge in the engine.

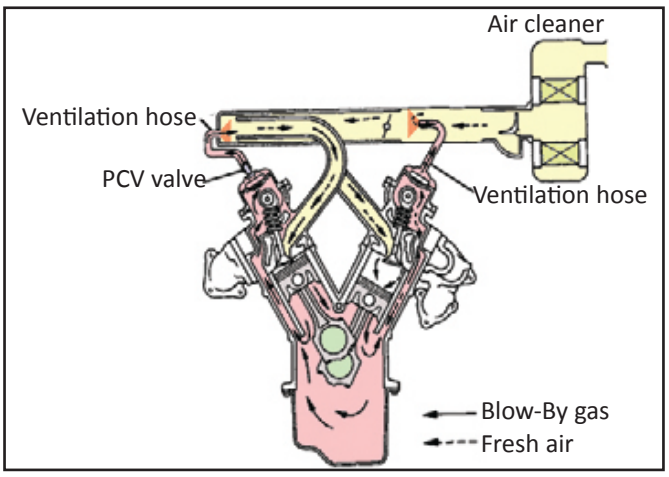


Fig: 2.3.5.11.6 Ventilation Structure

Fig: 2.3.5.11.7 Valves

Oil pressure switch

It sends the signal electrically to light indicator or gauge mounted on the dashboard of vehicle.

Fig: 2.3.5.11.8 Oil Pressure Switch

If the wires get shorted the light will come on or the gauge will read high.

Domain knowledge

- Diagnostic methods can be followed through the session
- Identification of Lubrication system components and their function
- Follow the standard operating procedure during practical session
- Thorough knowledge of working of lubrication system

Servicing air filter

Fig: 2.3.5.11.9 Particulate Air Filter

2.3.5.12: Air Filter Element Cleaning

Title of the sub-task	Description
Air Filter Element Cleaning (Foam)	1. Dip the foam in kerosene available in the first pot of the 'Air Filter Stand'. Then squeeze the foam to remove excess kerosene/Diesel & dirt. 2. Further clean the foam by dipping it into clean kerosene/Diesel available in the second pot of the 'Air Filter Stand'. Again squeeze it. Apply low pressure (less than 2 bar)air on foam to dry it. 3. Never use petrol for cleaning air filter foam. Incase petrol is used foam can get damaged permanently, it could catch fire in case of backfire. 4. Dip the foam completely in the third pot of the air filter stand that contains engine oil. Allow the oil to soak into the foam and then take out the foam. 5. Squeeze foam completely to take out excess oil. 6. Use dry lint free cotton cloth to remove excess oil. Do not twist the air filter foam as this may lead to tear or bulge. 7. Replace Diesel / Kerosene / Engine oil of air filter stand after 25 filter cleaning (in dusty area replacement frequency can be reduced). **Note**: Clean air filter at every 5000 Kms.(Cleaning frequency may get change in dusty area) replace at 15000 Kms
Air Filter Element Cleaning (Paper Type)	1. Use filtered compressed air of pressure less than 2 bar. Position air gun straight at 90 Deg. angle & 50 mm away from paper filter. Move the air gun along the fold line. 2. Positions air gun at 45 Deg. angle & 50 mm away from paper filter. Slightly twist the paper filter. Move the air gun along the fold line. 3. Keep air gun straight at 90 Deg. angle & 50 mm away from paper filter. Blow off remaining dust by moving air gun along the fold line. **Note** : Clean at every 5000 Kms.(In dusty areas increase the cleaning frequency). Replace at every 15000 Kms.

Engine Air Breather Tube Replacement	1. Press the clamp & disconnect the 'engine breather tube' from crankcase & 'Air Filter Box'. 2. Check the breather tube for any cracks & damage, if found replace. Refit the breather tube & its clamps properly Note: • Cracked or damaged 'engine breather tube' would cause dust entry inside engine leading to failure of vital engine components such as 'Cylinder Piston Assembly' & Crankshaft. • Ensure proper routing of Engine Breather Tube. Twisted or folded breather tube would cause oil leakage, smoky exhaust & engine oil high consumption. • Inspect the engine breather tube at every 5000 Km. If the breather tube is damaged or cracked replace with a new breather tube.

Tab: 2.3.5.12 Air Filter Cleaning and Replacement

2.3.5.13: Engine Cooling System

Cooling System: As our body requires air and water for cooling our system similarly engine also requires cooling. The cooling system has three primary functions. These functions are as follows:

1. Remove excess heat from the engine.
2. Maintain a consistent operating temperature of engine

Fig: 2.3.5.13.1 Cooling System in a Three Wheeler

Air cooled

- It is having metal fins on the outer edge of the engine
- These fins help in transferring heat from engine into atmosphere

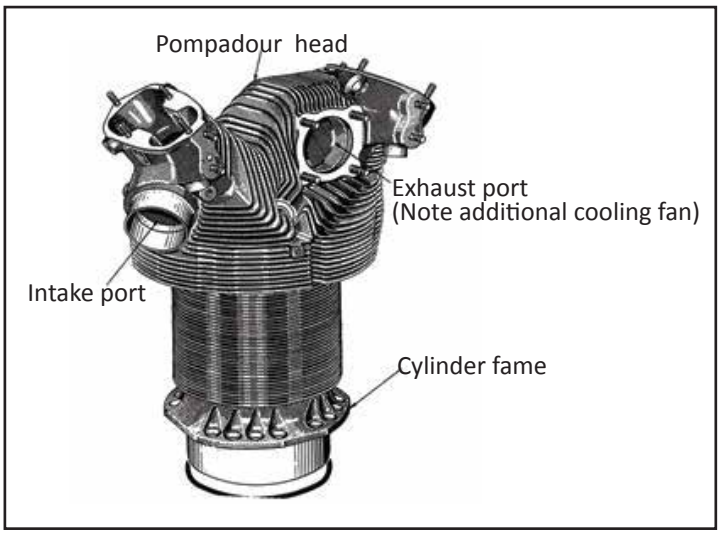


Fig: 2.3.5.13.2 Air Cooled Engine

2.3.5.14: Engine Fuel Filter

It is basically a filter connected in fuel supply line. Job of this filter is basically protection from dirt and rust so that it should not enter into the combustion chamber. It is basically available as a bundled pack having filter paper inside. It is available in almost all type of internal combustion engine. It plays a vital role because unfiltered fuel may leads to contamination and may create several types of problems. This contamination may be due to paint particle or dirt accumulated into the tank or may be rust due to moister in the steel tank etc. These particles needs to be prevented entering into the system as it may damage injectors and fuel pump. As the contamination particle may also get absorbed and lead to failure of precise components of injection system. Fuel filters also improve performance, as the fewer contaminants present in the fuel, the more efficiently it can be burnt

2.3.5.15: Fuel Cock Process

Title of the sub-task	Description
Fuel Cock Sediment Bowl Cleaning	1. Put the petrol cock knob to 'off' position. 2. Remove the petrol cock sediment bowl by using a ring spanner. 3. Pour out the petrol to remove sludge and sediment from "Petrol cock sediment bowl". 4. Remove strainer from petrol cock body. 5. Clean the bowl and the strainer with the help of petrol and nylon brush. 6. Refit the strainer and the bowl. 7. Put fuel cock knob in ON / Res. position & confirm no leakage.
Fuel Cock-paper Filter Element Replacement	1. Put fuel cock knob in off position 2. Remove fuel cock sediment bowl by open end spanner. 3. Take out fuel cock sediment bowl. 4. Pull out paper filter element with seal from fuel cock body 5. Clean sediment bowl thoroughly with low pressure compressed air. 6. Replace paper filter element with seal at every 15000 kms. 7. To avoid cross thread fitment of sediment bowl do pre fitment of sediment bowl by hand & there after tightening by ring spanner. 8. Put fuel cock knob in ON / Res. position & confirm no fuel leakage.

Tab*: 2.3.5.15 Fuel Filter Cleaning and Replacement*

2.3.5.16: Engine Exhaust System

- Functions of Exhaust system

  – From the passenger section burned exhaust gases are carried away

  – Maintain engine noise

  – All modern cars now have one or multiple catalytic converter

- Extreme backpressure - Better fuel economy but the performance is reduced
- Exhaust system flow - Not severely affected by bends in the pipe
- Mounted to cylinder head's exhaust ports – Mainly consist of cast iron or steel
- Exhaust temperature – It is basically associated with load factor on engine
- Headers - Aftermarket manifolds made of tube steel

  - Sometimes require modification to install

Exhaust pipes

- Usually three steel exhaust pipes - Header, exhaust, and intermediate pipe
- Muffler - Tubes and chambers smooth vibrations of air
- Resonator - Second muffler in line with primary muffler
- Catalytic converters - Contain catalysts to reduce engine emissions
- Muffler hangers - Support the muffler and pipes

Fig: 2.3.5.16.1 A Turbo Bike

Fig: 2.3.5.16.2 A Catalytic Converter

Fig: 2.3.5.16.3 Auto Rickshaw Silencer

2.3.5.17: Carburetor

Function of carburetor

In petrol engines, the air and fuel is mixed outside the engine and partly evaporated mixture is supplied to the engine. The fuels such as petrol, benzol and alcohol used in S.I. engine, vaporizes easily if injected in the flow of air, therefore, the engine suction is sufficient to draw the mixture easily in to the cylinder In engine operating conditions, the carburettor must: Measure the airflow of the engine. Deliver the correct amount of fuel to keep the fuel/air mixture in the proper range (adjusting for factors such as temperature)

Fig: 2.3.5.17 Carburetor

2.3.5.18: Carburetor Cleaning Process

Title of the sub-task	Description
Carburetor Float Chamber Cleaning	Loosen drain screw and flush out petrol from the “Carburetor bowl”. Then re-tighten the drain screw. Loosen clamps, of rubber duct. Remove intake manifold bolts and take out carburetor along with manifold and duct. Remove Philips screws securing the “Carburetor bowl” to the Carburetor body. Take out “Carburetor bowl” Pour out sludge and sediment from “Carburetor bowl” Clean the “Carburetor bowl” by petrol & soft nylon brush. Refit the “Carburetor bowl” Tighten the screws of “Carburetor bowl” Refit carburetor on vehicle & confirm no fuel leakage
Auto Choke Checking	Check for auto choke click sound when ignition switch is switched ON. If click sound. is not heard then - Remove Choke Unit from Carburetor assembly. Switch ‘ON’ Ignition Key. Solenoid operated choke plunger must get lifted for a second & then again plunger must fall down in engine OFF condition. Connect solenoid operated choke connection to external supply of 12volt DC & check / confirm the working of choke (whether solenoid operated choke gets ‘ON’ i.e. plunger remaining lifted as long as the external supply is in connection. Set multimeter on 200 ohm range. Connect multimeter probes to auto choke coupler. Note the resistance value & compare with specs.

Tab*: 2.3.5.18 Carburetor Checking and Cleaning*

2.3.6: Basic of Electricity & System

Fundamentals:

- **Amperage (Amps or A)**

  The Amp is the unit of electron flow, or how many electrons are passing along a conductor in a second. Amps (A) = I or 'Intensity' of the current flow.

- **Voltage (Volts or V)**

  It is the measurement of electric potential or the attracting / repelling force causing electrons to flow through the circuit.

  Volts (V) = E or 'EMF' (Electromotive Force).

- **Resistance (Ohms or Ω)**

  An ohm is the unit of resistance or how hard a conductor resists the flow of electrical current. Ohms (Ω) = R or 'Resistance' to electron flow.

- **Ohm's Law**

  The flow of current in a circuit is directly proportional to the applied voltage and inversely proportional to the resistance.

  Ohm's Law is expressed as an equation that shows the relationship between voltage (E for EMF), current flow (I) and resistance (R).

  E = I x R or Voltage = Amps x Resistance

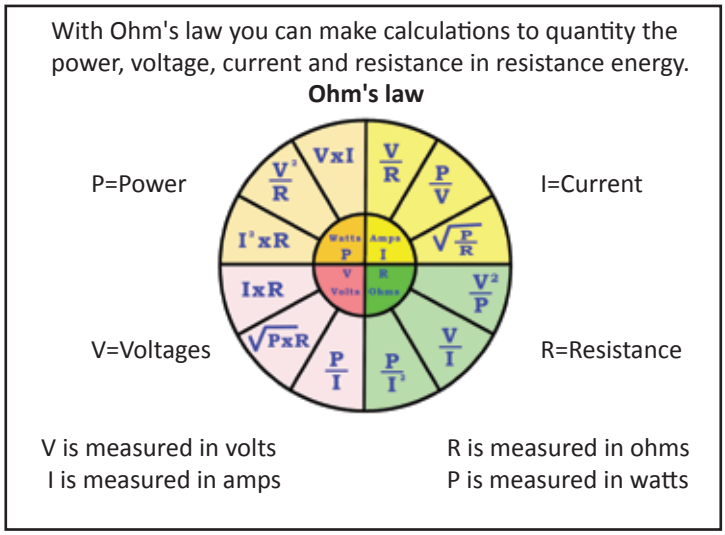


Fig: 2.3.6.1 Ohm's Law

- **Power**

  Many electrical devices are rated by how much power they consume, rather than by how much they produce. Power consumption is expressed in watts. It is denote by the letter W.

The relationships among power, voltage, and current are expressed by the Power Formula:

W = E x I W = V x I

As per Ohm's Law V = I x R

Therefore,

$$W = \frac{V^2}{R}$$

Or W = I2 x R

Functions of Major Components of Auto Electrical:

An automotive battery is an electrochemical device capable of producing electrical energy. It has several important functions which are as follows:

- It operates the starting motor, ignition system, electronic fuel injection, and other electrical devices for the engine during cranking and starting.
- It supplies all the electrical power for the vehicle accessories whenever the engine is not running or when the vehicle's charging system is not working.

Fig: 2.3.6.2 Starting Motor (Cranking Motor)

- It acts as a stabilizer of voltage for the entire automotive electrical system.
- It stores energy for extended periods of time.

Starting Motor (Cranking Motor):

The function of starting motor is to start the engine by drawing direct current (dc) from the battery. While cranking the engine with the help of the starting motor, it draws around 250 Amps of current from the battery for few seconds (4-5 sec.).

Alternator:

The functions of alternator are as follows:

- It produces alternating current when the engine is running (the alternator is run by a V-belt connected with engine crank shaft pulley).
- It also converts the alternating current into direct current with the help of rectifier fitted along with it.
- It is the source of electricity in automobile when the engine is running.
- When the engine is running the alternator charges the battery by supplying the current to the battery through the charging circuit

Cut Out Unit:

This is fitted into the charging circuit. It is a safety device for the battery in automobile. When the alterntor / dynamo voltage is more than the battery voltage it helps to flow the current from alternator / dynamo to battery. But when the alternator / dynamo voltage is less than the battery voltage it avoids to flow the current from battery to the alternator / dynamo by cutting out the contact breaker points.

Voltage and Current Regulator:

The function of voltage regulator is to regulate the voltage (12 volts to 14.2 volts) in the circuit. The function of current regulator is to regulate the current flow in the circuit as per the demand of various electrical and electronic components.

Ignition Coil:

It is fitted in the ignition system of engine. It is just like a step up transformer. The function of ignition coil is to convert 12volt dc to around 22000 volts dc (low tension current in to high tension current) and supply to the spark plugs.

Fig: 2.3.6.3 Ignition Coil

Distributor:

The function of distributor is to distribute the high tension current to the spark plug according to the firing order.

Fig: 2.3.6.4 Distributor

Spark Plug:

According to the firing order it creates spark in the combustion chamber so that air and fuel mixture can be ignite.

Lighting System:

Head Light helps the driver to drive the vehicle at night. The functions of head lights are

1. It increases visibility at night
2. It helps to over take the other vehicle
3. By using dipper switch it helps the opposite drivers to drive safely.

Fig: 2.3.6.5 Spark Plug

Side Lights are used for parking purpose.

Rear Light is for giving indication to the road users behind it.

Break Light : It operates when the driver applies the break which indicates the other road users behind it.

Reverse Light: This light glows when drivers engage the reverse gear of the vehicle, which, warns other road users behind the vehicle.

Fog Lamps : The colour of fog lamp is amber (yellow). The amber colour light rays have the quality to penetrate into fog. So, during foggy climate this light helps the driver and other road users use the road safely.

Left and Right Indicator lamps help to take turn to left or right.

Interior Lights: There are two types of interior lights.

1. Dash board panel lights which helps the driver to read all the meters such as Speedo meter, oil pressure gauge, etc.
2. A cabin light helps the occupants' of the vehicle.

Other Important Accessories:

- Horns: For the safe movement of vehicle it helps to warn other road user to clear the road.
- Wind Screen wiper: For a clear front view of the vehicle specially during rain it helps in cleaning the wind screen.
- Electric fuel pump: It supplies fuel from the fuel tank to the carburettor or injector.
- Fuel gauge: Shows fuel level in the fuel tank or even quality of fuel also.
- Sensors and actuators: In the modern vehicles sensors and actuators are fitted in various system of engine along with computer control system. The function of all those sensors and actuators shall be discussed in the next level.

2.3.7: Battery

Battery and its Importance:

The battery is the main power source for the entire vehicle. It supplies electrical energy when starting the vehicle and when accessories are operating with the engine off or at low idle. The battery will also compensate for any shortage of power from the alternator when the electrical load is especially heavy. For this reason the battery needs to be checked first whenever a vehicle is brought in with an electrical problem.

The storage battery is an electrochemical device that converts electrical energy into chemical energy and stores this energy until electrical energy is once again needed. Electrical energy is produced by a chemicalreaction between two dissimilar conductors (plates) that are immersed in an electrolyte. The amount of electrical energy a battery can produce depends upon the size, weight and active area of the materials in the plates and the quantity of sulfuric acid in the electrolyte. When al the active materials on the plates have reacted with the electrolyte, the battery is said to be in a discharged state. The Battery is the Heart of the Automotive Electrical System. The battery must be in good usable condition for the rest of the electrical system to function correctly. In this chapter we describe the battery service and testing methods necessary to assure proper battery operation.

Fig: 2.3.7.1 Battery

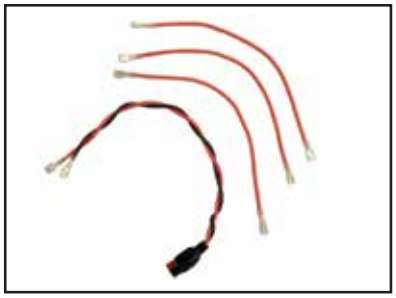


Fig: 2.3.7.2 Connecting Wires of Batteries

Checking battery voltage using multi-meter:

A miltimeter is an measuring instrument used to measure AC and DC current, Voltage, Resistance in a single unit. It is also called as volt meter. There are two types of multimeter digital multimeter and analog multimeter. The beauty of multimeter is providing several measurement functions.

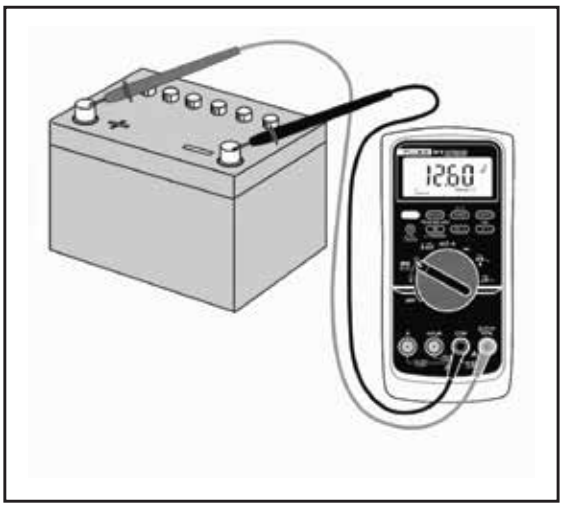


Fig: 2.3.7.3 Battery Attached to Multi Meter

Initial multi meter adjustment: Rotate the knob in the multi-meter to voltage position this indicates that we are going to measure voltage

Connecting terminals: Connect positive terminal of voltmeter i.e. Colored red to positive side of battery and negative terminal i.e. colored black to negative side of battery

Readings: Note down the readings from the multi-meter

Checking battery charge level using hydrometer:

A hydrometer is basically a device used for measuring liquid specific gravity. It is basically the ratio of the density of the liquid to the density of water

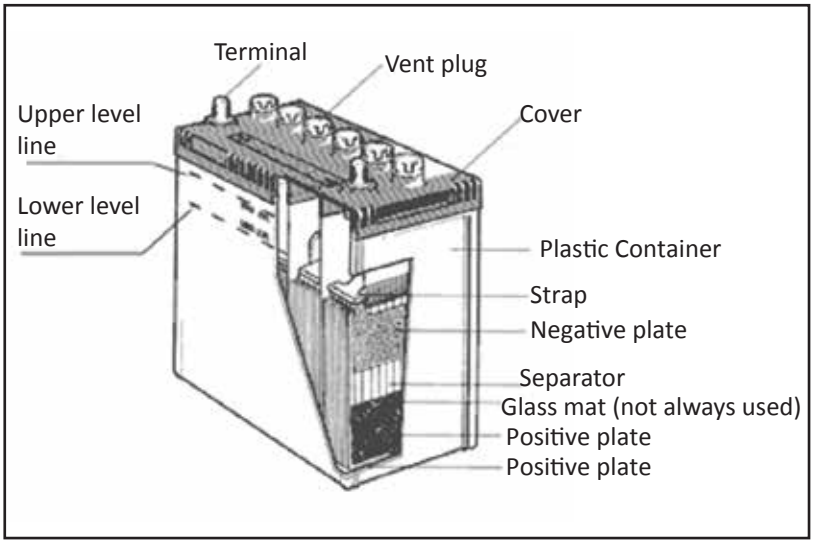


Fig: 2.3.7.4 Battery

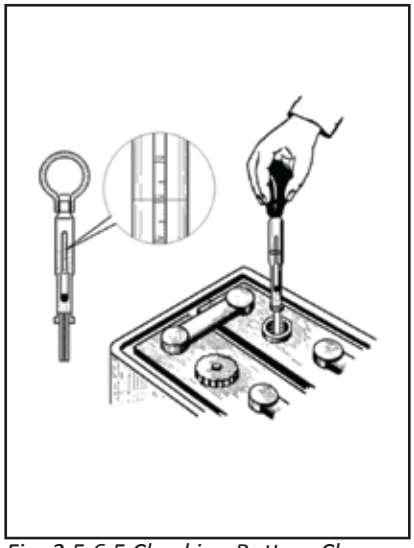


Fig: 2.5.6.5 Checking Battery Charge Level

2.3.7.1: Checking Battery Charge Level

Sub Titles	Description
Removing vents cap	1. Wear safety glasses 2. Remove vents caps of all the battery cells
Checking electrolyte level	1. Once the vents caps are removed squeeze the hydrometer bulb 2. Insert the tube into cell then slowly release the bulb to allow the electrolyte flow in to hydrometer and float to move up 3. Do not remove the hydrometer from the cell and ensure that float is free without touching the side walls
Readings	1. Take the reading of electrolyte level on the float. 2. Repeat this for remaining cells

Tab: 2.3.7.1 Checking Battery Charge Level

2.3.7.2: Battery Charging Process

Charging battery:

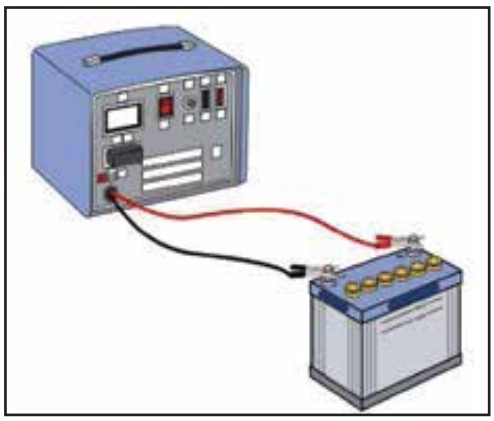


Fig: 2.3.7.2 Charging a Battery

Sub Titles	Description
Initial setup	1. Remove the battery from the vehicle before charging. 2. Clean dirt and corrosion from the terminals 3. Check electrolyte level and add distilled water if needed 4. Charge the batteries in a ventilated area
Safety Precautions	1. Wear safety glasses, shoes, rubber gloves and apron 2. Do not smoke and keep sparks or flames away from the battery 3. Do not mix batteries
Charging	1. Remove the vent caps, connect the batteries and switch ON the charger 2. Preferably charge the battery at slow rate 3. Intermittently check specific gravity during charging, stop charging when specific gravity reaches full charge state 4. Intermittently check battery temperature by touching the battery during charging. 5. If battery becomes hot, stop charging and let it cool before resuming charging

Tab: 2.3.7.2 battery charging

2.3.8: Power Flow System

Transmission system is one of the important integral part of motor vehicle. Job of transmission system is to supply internal combustion output to the drive wheels. As the engine rotation speed is very high it reduces it to slower wheel speed thus in this process torque is increased. It is even used in bicycle, any machine or wherever high rotation speed needs to be converted in torque.

Transmission System:

The transmission system consists of following components.

1. Clutch assembly
2. Gear box assembly (transmission case assembly)
3. Propeller shaft

Clutch Assembly:

Clutch Assembly: Job of a clutch is to transmit rotary motion of one shaft to another shaft as and when required.

The axis of driving shaft and driven shaft are coincident.

Fig: 2.3.8.1 Different Parts of Clutch Assembly

Function of a Clutch:

1. To disconnect the engine power from the gear box as required under following circumstances.

- To start the engine and warm it up.
- To facilitate to engage 1st and 2nd gear to start the vehicle from rest.
- To facilitate to change the gear as required.
- Disconnecting drive from the engine to stop the vehicle after application of brakes.

2. Allow the engine to take up load gradually without shock or jerk.

Requirements of a Clutch:

1. Torque transmission: The clutch system should be capable of transmitting engine torque.
2. Gradual engagement: To avoid sudden jerks clutch should be engaged gradually.
3. Heat dissipation: During clutch operation a large amount of heat is generated due to friction. The clutch should be capable to dissipate this heat.
4. Dynamic balancing: The clutch should have capability of dynamic balancing specially in high speed engine.
5. This particularly required in the case of high speed engine clutches.
6. Vibration damping: During power transmission huge noise is produced due to vibration. Clutch should be capable to damp the vibration.
7. Size: The clutch size should be small so that it should require minimum space.
8. Free pedal play: The clutch should have free pedal play in order to reduce effective load on the carbon thrust bearing and its wear.
9. Easy in operation: It should be operated by little effort by the driver and should be easy to operate.
10. Lightness: Clutch driven member should be light weighted so that after the disengagement of the clutch it will not continue to rotate for any length of time

Main Parts of a Clutch:

Clutch main parts divided in three groups

1. Driving members: Flywheel is the driving member of clutch assembly which is mounted on the engine crankshaft. It is connected to a cover which is having pressure plate, pressure springs and releasing levers inside. Flywheel and cover rotate all the times. The clutch housing and the cover provided with openings, dissipate the heat generated by the friction during the clutch operation.

2. Driven members: A disc or plate called clutch plate is known as the driven member of clutch assembly. On the splines of the clutch shaft which is also known as primary shaft, it slides freely lengthwise. When the disc or plate is gripped between flywheel and pressure plate, it rotates the clutch shaft through the splines.

3. Operating members: The main components of operating member of clutch assembly are Foot pedal, releasing bearing, release lever and springs.

Gear Box (Transmission Case) Assembly:

Different gear ration in the gear box or transmission system is required so that vehicle can move at different speed. When we start the vehicle, on the flywheel maximum amount of torque is available. With the increase in engine speed amount of torque is reduced in flywheels thus create a situation to go for higher gear ratio.

Fig: 2.3.8.2 Different Parts of Clutch Assembly

Function:

1. The main purpose of the gear box is to provide a means to vary the leverage or torque ratio between the engine and the road wheels as required.

2. The transmission also provides a neutral position mechanism thus when engine and the road wheels can be disconnected in the engaged position of clutch.

3. A means to reverse the car by selecting the reverse gear.

Servicing Exhaust Tail Pipe:

- Functions of exhaust system
  1. Burned exhaust gases are carried away from passenger section
  2. Reduce engine noise
  3. Most new cars have one or more catalytic converters
- Excessive backpressure – Increases fuel consumption and reduces performance
- Exhaust system flow - Not severely affected by bends in the pipe
- Mounted to cylinder head's exhaust ports – This normally made of steel or cast iron

Fig: 2.3.8.3 Turbo Motorcycle

Fig: 2.3.8.4 Exhaust Pipes

Fig: 2.3.8.5 Part of Exhaust System

- Exhaust temperature - Related to the amount of load on the engine
- Headers - Aftermarket manifolds made of tube steel - Sometimes require modification to install

Exhaust Pipes:

- Usually three steel exhaust pipes - Header, exhaust, and intermediate pipe
- Muffler - Tubes and chambers smooth vibrations of air
- Resonator - Second muffler in line with primary muffler
- Catalytic converters - Contain catalysts to reduce engine emissions
- Muffler hangers - Support the muffler and pipes

2.3.8.1: Silencer Tail Pipe Cleaning Process

Title of the sub-task	Title of the sub-task
Silencer Tail Pipe Cleaning	Park the vehicle on center stand in neutral gear position & with engine in 'off' condition. Insert 'Wire Bristle Brush' into the tail pipe of silencer assembly and scrub inside walls of the tail pipe. While scrubbing, ensure that pressure is applied to the tail pipe inner surface so that holes on the tail pipe can get cleared off from carbon black / soot. Start the engine and give throttle to flush out all the soot that has been scrubbed off the surface. The scrubbing and flushing activity is to be carried out till no more soot is seen coming out of the tail pipe after starting the engine. Note : Ensure that no one is in the direct path of the tail pipe to protect from carbon particles. Do not raise the engine rpm too high Switch Off the engine, direct the compressed air inside the tail pipe so that holes on the tail pipe get cleared. Ensure that the compressed air hose nose is directed towards the wall / holes on wall around till the end of tail pipe. Once again start the engine and give throttle to clear any carbon particles left inside the silencer.

Tab: 2.3.8.1 Silencer Tail Pipe Cleaning

2.3.9: Drive Shaft / Propeller Shaft

Propeller shaft:

This is the hollow tubular shaft which transmits the drive from the gear box to the bevel pinion of finaldrive. It consists mainly of three parts:

1. Shaft- It is typically made up of tubular cross section so that it can withstand with torsional loads with a facility of dynamic balancing.

2. Depend on the type of rear axle drive it can have one or two universal joints. When the vehicle is in running position universal joint maintain up and down movement of the real axle.

3. Slip joint- Presence of slip joint depend on the type of drive in the vehicle. When rear axle movement demands adjustment, it helps in adjusting length of propeller shaft.

Fig: 2.3.9.1 Propeller Shaft System

Fig: 2.3.9.2 Propeller Shaft

Front and rear axle:

Front axle:

Front axle is made up of steel forging. Due to load of the vehicle bending load is managed by front axle and also during breaking of wheels it also manage torque load. Due to these grounds central portion of the front axle is made of I-section where as end is circular.

Fig: 2.3.9.3 Rear Axle of a Three Wheeler

A downward sweep is given to the centre portion to keep a low chassis height. Both the end of front axle are mounted with stub axles with the help of king pin. The front road wheels are mounted on stub axles.

The functions of rear axle are as follows:

1. It bears the weight of vehicle body and load due to occupants through springs.
2. It enables to transmit driving and breaking torque to the chassis frame and body of the vehicle.
3. It also experience the side thrust or pull due to any side load on the wheel.
4. It supports the bevel pinion (drive from propeller shaft transmit to the pinion), bevel gear, cage of sun gear and star pinions, axle shafts and different support bearings.
5. Rear road wheels are mounted on the axle shaft.
6. The differential mechanism enables to move outer wheel faster than the inner wheel while taking a turn.

2.3.9.1: Battery inspection Process

Battery inspection:

The job of electrical battery is to convert stored chemical energy into electrical energy. It is basically consists of one or more electrochemical cells. Each of the electromechanical cells is having a positive terminal called cathode and a negative terminal called anode. Due to electrolyte process ions move between electrode and terminals as a result current start flowing from battery to perform required work.

Functions of battery is to provide electricity to vehicle systems, when engine is not running

Its most important function is to start the engine by providing electric energy to starter motor and ignition system

Work cycle

Sub Titles	Description
Check for battery crack	Inspect battery body for cracks or damage which may result in electrolyte leakage
Check battery terminal and connectors	Inspect battery terminals and connectors for looseness, dirt and corrosion
Cleaning and tightening	1. Clean dirty and corroded battery terminals and connectors with a mixture of hot water and baking soda 2. Use wire brush to remove corrosion 3. Tighten the loose connectors

Tab: 2.3.9.1 Replacing Coolant Checking Battery

2.3.10 Suspension System

Importance of suspension system

The main purposes of suspension system are as under:

1. Provide riding comfort and safeguard the rider against road shocks
2. Effect of stress raised due to road shocks on the motor mechanism is minimized to provide spongy effect.
3. During travelling rough and bumpy ground it maintain the body perfectly in level. Thus the body is mainly in level during up and down movement.
4. Shock loading and vibration due to irregular road surface is isolated from the structure of vehicle
5. Bear torque and breaking exertion and also provide mandatory height to body structure.

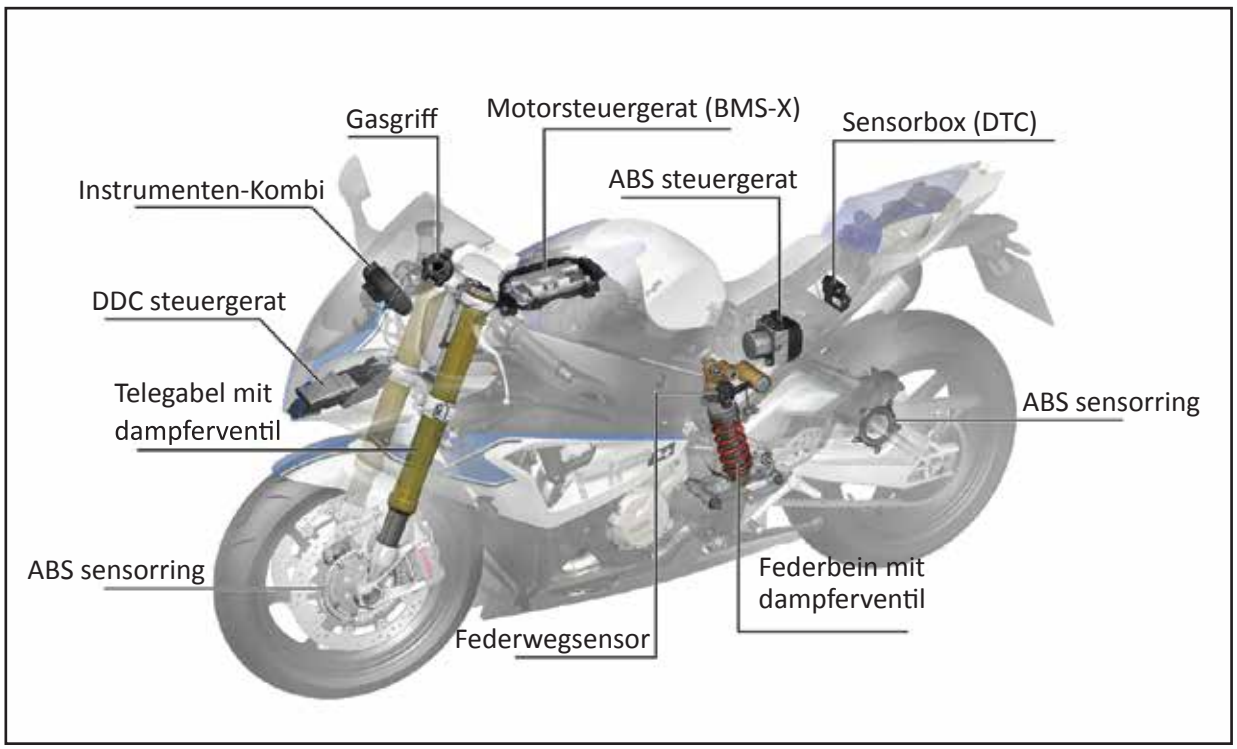


Fig: 2.3.10.1 BMW Motor and Dynamic Control DDC

Functions of a suspension system:

1. It provides comfort.
2. It gives cushioning effect.
3. Strain on frame and other components which is produced to road shocks are reduced.
4. Prevent the vehicle from rolling and maintain body level
5. It provides a good contact for road holding, i.e. the system must always keep the tires in contact with the road.
6. Transfer force generated due to breaking on chassis and driving torque to the wheels

Fig: 2.3.10.2 A four Stroke Engine Auto

Various components of suspension system

Mechanical suspension

- Leaf Springs
- Coil Springs
- Rubber Springs
- Torsion bars

Fig: 2.3.10.3 Components of a Suspension System

Hydraulic suspension

- Hydraulic Shock Absorber
- Telescopic fork

Air suspension

Compressed air is used for air suspension system

Replacement of strut/shock absorbers:

Why we do it?

It is a mechanical device. Job of a shock absorber is to damp the shock and dissipate energy. It helps in reducing the shock transfer to the body of vehicle as well as rider during travelling over a rough ground, help in handling vehicle to provide a pleasant riding experience. Every shock up/suspension has its own life. Suspension system has damper with spring. This is working as shock absorber/strut.

Fig: 2.3.10.4 Shock Absorber System

Fig: 2.3.10.5 Shock Absorber

Life of shock absorber is affected due to following reasons:

- Overloading
- Road conditions
- Worn-out Linkage/bushes
- Leakage of fluid/gas
- Broken casing
- Deterioration of Bump stopper
- Rubber bellows
- Improper handling in service

2.3.11: Servicing of Suspension System

Title of the sub-task	Description
Inspection of suspension system	Steps to be followed in inspection of suspension system 1. Place the vehicle on a hoist or jack. 2. Lift the vehicle with jack stand to a certain height and bloc the wheel so it should not move forward. 3. Slowly rotate the front tyre, looking at the tread wear if so toe setting, or camber setting is to be done. 4. Place your hands on the tyre at the 3-and-9 o'clock positions of the tyre and try to shake it firmly back and front if excessive ply use tie rod ends could be loose/worn out. 5. Place the hand on the tyre at 6-and 12 o'clock positions of the tyre and shake it back and front if excessive ply use tie rod ends could be loose/worn out 6. Any joint/pivot point that has ply or a clicking sound needs to be fully inspected and replaced in each suspension system. 7. Lubricate all the replaced components by grease to avoid wear and tear.
Servicing of suspension system	Steps involved in servicing suspension system 1. Park the vehicle on the level ground and loose the nuts on both sides of the front & back end places and then place the vehicle with ramps or jack stands 2. Remove shock bolts from shock tower by using ratchet and socket. 3. Disconnect the shock absorber from the suspension by removing bolt and nut using socket set or a nut splitter. 4. By using locking pliers remove the shock absorber from the bottom and top bolts mounted on studs with retaining brackets.

Tab: 2.3.11 Servicing Suspension System

2.3.12: Struts and Shock Absorber

Suspension system is consists of various parts namely shock absorbers, springs, and linkages, which connects a vehicle body to its wheels

Suspension system improves vehicle stability by providing better vehicle weight distribution and traction of wheels with road surface, in conditions such as:

- Sudden brakes operation
- Sudden acceleration
- Driving on rough surfaces, i.e. bumps and potholes

Suspension system also makes vehicle stable while turning at high speeds

Suspension system enhances the comfort of occupants by reducing road noise, bumps and vibrations

Suspension system protects vehicle components and luggage from damage or wear when vehicle runs on rough surface

2.3.12.1: Checking Shock Absorbers

Title of the sub-task	Description
Check for oil leakage	Inspect struts and shock absorbers for any oil leakage
Check for mechanical damage	Inspect struts and shock absorber for wear, bending or mechanical damage
Check for deterioration	Inspect rubber parts for damage or deterioration
Checking suspension working condition	1. Inflate all tyres to correct pressure 2. Bounce the vehicle by pushing down the front left and right side 3 to 4 times. Apply similar pressure on both the sides

Tab: 2.3.12.1 Checking Shock Absorbers

2.3.13: Dismantling & Assembling of Wheels

Tyres play an important role as an automobile component. Many parts may make up a car but usually one part is limited to one function. Despite its simple appearance, a Tyre differs from other parts in that it has numerous functions

Fig: 2.3.13 Dismantling & Assembling of Wheels

2.3.13.1: Dismantling and Assembling of Wheel

Title of the sub-task	Description
Removing Hub cap	1. Use a flat screwdriver or the flat end of the lug wrench to remove the hubcap. 2. Place the hubcap in your trunk so it doesn't get scratched up
Loosen wheel nuts	1. Fit one end of the lug-nut wrench on to the lug nut 2. Turn it counter clockwise. 3. Loosen each nut. 4. Continue until you've loosened each lug nut.
Jack the vehicle	**Find your vehicle's jacking point.** 1. Place the jack in place and raise the vehicle slowly. Make sure the vehicle doesn't try to roll away as the wheel comes off the ground. **Jack the vehicle up until it is high enough to remove the old wheel and put the new wheel on.** 2. The new wheel may be bigger in diameter than the old flat wheel. 3. You need enough room for the new Tyre to fit.

Tab: 2.3.13.1 Dismantling and Assembling of Wheel

2.3.13.2: Repairing Punctured Tyre

The process of fixing a puncture is a very tedious and the time consuming task for persons who cannot use to handling such repairs.

Fig: 2.3.13.2 Repairing Punctured Tyre

Title of the sub-task	Description
Tube Tyre	**Procedure followed for punctured tube** Step 1: Check the rubber for pierced and examine whether the cut or puncture has happened. If you failed to check the puncture on tyre .check the tube such that tube itself has developed wear and tear/cuts. Step 2: Jack up the vehicle using jacks and ensure the vehicle is lifted in a balanced position Step 3: using the lug-nut spanner, unscrew the bolts and remove the wheel. Step 4: Separate the tyre from the rim .Use the tyre iron to remove the tyre from the rim. Slot the tool at the intersection of the rim and the rubber and gently push the lever and allow the tyre to gradually side out along the circumference of the rim. Step 5: unbolt the valve and separate the tube from the tyre. Inflate the tube and immerse the tube in water. Step 6: The air bubbles in the water indicate the punctured area in the tube. Step 7: Rub the punctured area with the file to ensure that the adhesive allows the rubber patch to stick properly. Step 8: use the adhesive to stick the rubber patch over the punctured area. Step 9: check if the puncture is sealed by submerging in water. Put the tube back into the tyre. Push the air valve through the hole of the rim and gently push the tube into the tyre. Put the wheel back and tighten the nut.

Tubeless Tyre	**Steps involved in tube less tyre puncture** Step 1: First identify the location of puncture .Check the nail, screw is pierced the rubber or not. Step 2: Remove the object that has pierced and ruptured the tube Insert the smothering tool into the punctured hole to ensure that is large enough to repair the strip Step 3: Leave the tool inside the tyre Step 4: Insert the Puncture repair strip halfway into the picture strip insertion tool like thread Step 5: Use the puncture repair insertion tool to push the puncture strip inside the tyre. Step 6: Trim of the strip, if it is protruding outwards with a knife.

Fig: 2.3.13.2 Repairing Punctured Tyre

2.3.14: Steering System

Hand operated steering wheels which are placed in the front of driver, when operated by the driver steering system turns the front wheels as per the movement on steering wheel. It is having following components: steering column, universal joints which helps in deviation from a straight line.

Functions of steering system:

1. Swinging wheels left to right or vice versa.
2. Turn the vehicle as per driver requirement
3. Offer stability to the direction vehicle is moving
4. It helps in controlling wear and tear of tyres.
5. It helps in achieving the self-straightening effect.
6. Rotation of the steering wheel is converted into an angular turn of the front wheels.
7. It multiplies the effort of the driver by leverage in order to make it fairly easy to turn the wheels.
8. Major portion of the road shock is absorbed by it so that it should not transmit to driver hands.

Various components of steering system:

- Steering wheel
- Steering column
- Steering linkage with universal joint
- Steering gear box
- Drop arm
- Tie rod
- Steering arm
- Track rod with adjuster
- Ball joints
- Stub axle arm

Fig: 2.3.14.1 Three Wheeler Steering

Fig: 2.3.14.2 Two Wheeler Steering/Handle Bars

2.3.15: Brake System

Brake:

Brakes are a control mechanism of vehicle and thus form an import system for the vehicle. Job of break is to slow down or stop the vehicle within a smallest possible distance. It converts kinetic energy of the wheels into the heat energy which is dissipated into the atmosphere.

Fig: 2.3.15.1 Drum Brake

Functions of brakes:

There are two distinct functions of the brakes:

1. During emergencies it stops or slows down the vehicle in minimum possible distance.
2. To control the vehicle speed while moving on plain roads and hills.

Fig: 2.3.15.2 Disk Brake

Types of brakes:

1. With respect of application:
   (a) Foot brake
   (b) Hand brake
2. Based on braking contact method :
   (a) Internal Expanding brakes
   (b) External contracting brakes (e.g. disc brakes of automobile and railway brakes)
3. With respect to the brake gear:
   (a) Mechanical brakes
   (b) Power brakes

Fig: 2.3.15.3 Disk Brake Assembly

Principle of braking:

The brake is a friction creating device which reduces the vehicle speed at a faster rate. The rate of speed reduction by brake is higher than the process of obtaining it through gear change or removing pressure

Functions of a good braking system:

- The brakes should stop the vehicle in shortest possible distance and without skidding the vehicle.
- The brakes should work equally on types of roads.
- This should be smooth so that driver does not need to apply extra pressure on pedal.
- Should work uniformly irrespective of weather condition.
- It should have very few wearing parts.
- It should require little maintenance.
- Brakes, when applied should not disturb the steering geometry.
- There should be minimum sound when brakes are applied

Different types of brakes:

- Mechanical brakes
- Hydraulic brakes
- Vacuum Servo brakes
- Pneumatic brakes
- Disc brakes

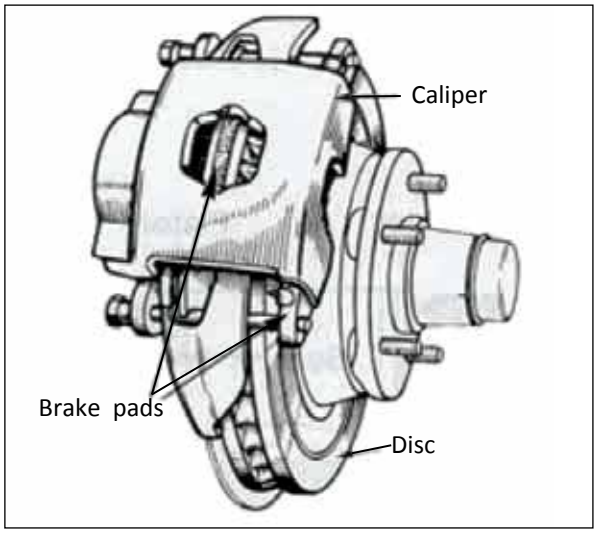


Fig: 2.3.15.4 Parts of a Brake

Mechanical brakes: Brakes which operates mechanically by using cam, rod and linkage with drum brake.

Hydraulic brakes: Brakes which are operated by the pressure on hydraulic fluid are called hydraulic brakes. This braking system consists of master cylinder, fluid line, wheel cylinder and drum brake

Vacuum servo brakes: Application of brake is assisted by engine vacuum for suction and is called vacuum servo brake. This system consists of vacuum reservoir, master cylinder, vehicle control unit, server with diaphragm.

Pneumatic brakes: Brakes which are assisted to work on compressed air are called pneumatic brakes. Braking system consists of following components; air compressor, air tank, safety valve, brake valve, brake chamber, diaphragm/ chamber with drum brake.

Disc brakes: Disc is mounted on the wheel, instead of brake drum, which rotates between caliper assembly. Caliper pads/friction pads are operated hydraulically by means of piston which comes in contact with rotating disk. Due to friction it reduces the speed of the disc as well as wheel. System consists of master cylinder, caliper assembly, caliper pad/friction pad and disc. Different type of braking systems are used in different class of vehicles as per the load carrying capacity, which takes care of the momentum of vehicle.

2.3.15.1: Servicing of Mechanical Brake

Brakes are basically functional on rotating wheels or axles, but may also function in other way such as the surface of a moving fluid. As per their requirement many vehicle uses combination of brake mechanism. Drag racing cars uses wheel brakes along with parachute, or airplanes uses both wheel brakes and drag flaps raised into the air during landing

Title of the sub-task	Description
Steps for repairing mechanical brakes	1. Remove/unthread the wheel nuts with spanner and separate the wheel from brake drum. 2. Straighten and pull out the spilt pin, fitted in castle nut, using combination plier. 3. Lock the axle shaft by putting the vehicle and open the castle nut using socket and handle. 4. Hammer the axle shaft lightly by using brass drift, this may contract brake drum loose and remove brake drum. 5. Remove brake shoe lock, mount on anchor pin, with the help of nose plier. 6. Serrate the brake shoes from brake lever cam and the steady post. 7. Clean the brake shoes and the brakes drum with the help of emery paper. 8. Fit both the shoes on the cam and anchor pin and lock them. 9. Fit the brake drum over the axle shaft and tighten the castle nut with the help of socket and handle. 10. Tighten the brake shoe adjusting nut with the help of spanner, this makes the shoes to expand and grip the drum firmly. 11. Loosen the adjusting nut by a little amount and turn the wheel, it must roll free. Do the shoe adjustment this way. 12. Tighten the main nut locked it properly. 13. Fit the wheel over brake drum and tighten wheel nuts. 14. Take a road test of the vehicle.

Precautions during servicing of mechanical brakes	1. Shoe's lock must be placed properly. 2. Shoe's adjustment should be done properly. 3. If there is any lubricant etc. on brake lining, it must be cleaned by washing the brake shoe with petrol and further cleaned using emery paper. 4. Brake cable should be checked for its tension and fitted straight. 5. Free play should always be kept in brake pedal. 6. Shoe return spring should be checked for its tension and fitted straight. 7. Replace the brake drum, if it is worn out beyond specifications never get the sleeve fitted in it. 8. Spilt pin should be placed in castle nut and bended. 9. Spring washer should be placed below each wheel nut and these nuts must be tightened in the right manner and with the right torque. Over- tightening may damage the stud/-threads. 10. Brake's testing should be done at nominal speed of 20 – 35 km/hr only.

Tab: 2.3.15.1 Mechanical Brake Servicing

2.3.15.2: Maintenance of Brake

Brake System:

Brake system is used:

- To reduce vehicle speed quickly while driving
- To stop vehicle when needed
- To hold the wheels on slopes

Brake system is combination of mechanical, hydraulic and electronic components

Fig: 2.3.15.2 Servicing Brake Liners and Pads

Title of the sub-task	Description
Brake liner	1. Steps to be followed during servicing of brake liner 2. Jack up the vehicle using floor jack and remove the wheel 3. Release the parking brake 4. Detach the drum 5. Remove the screw attaching drum from bearing hub 6. Clean the back plate with a stiff brush to remove the accumulated brake dust 7. Remove the grease on shoes using waste or emery paper 8. Inspect brake shoes for wear either by checking thickness of shoe is lining with a base metal or to check thickness of brake lining. Replace the brake shoes if thickness of lining is above service limit.
Brake pads	1. Steps to be followed during servicing of brake pads 2. Jack up the vehicle using floor jack and remove the wheel 3. Remove the brake caliper by removing the bolt 4. Remove the brake pads and clean using emery paper 5. Check the brake pads thickness if it exceeds wear limit then replace it with new brake pads 6. Apply grease to caliper bolts before refitting

Tab: 2.3.15.1.2 Maintenance of Brake

2.3.15.3: Overhauling Hydraulic Disc Brake

Disc brake is one of the latest braking mechanism which uses callipers to press pairs of pads against a disc to create friction which interns slow down shaft rotation. It helps in either reducing the rotational speed or to hold it stationary. When the brake is applied motion energy is converted into heat energy and gets dissipated in the atmosphere. Now a day most of the vehicles are using hydraulic disc brakes. Principle of a disc brakes are commonly applicable to any rotating shaft which needs to be controlled for slowing down or

Title of the sub-task	Description
Steps for Servicing of the Disc Brakes	1. Keep the vehicle on hard surface 2. Loosen the wheel nuts 3. Raise the front portion of a car support the chassis with stand. 4. Remove the wheel nuts and remove the wheel 5. Loosen the castle nut and remove hub from splined shaft. 6. Unscrew the bleeder valve and drain the brake fluid from fluid line 7. Now loosen the bolts of caliper holder from caliper assembly and remove the friction pads and dust caps 8. Slowly remove the scaling ring from assembly 9. Unload the caliper assembly 10. Remove the piston, dust cover, return spring and keep it aside 11. Thoroughly clean all components and inspect for wear 12. Inspect the disc surface for scratches 13. Measure for the defection disc and if more, replace the disc or it will create shaking steering or brake judder 14. Inspect the thickness of disc (std-11mm, limit 9.5mm) 15. Inspect the piston for wear or replace the kit 16. Assembly the disc on the hub 17. Fix the piston in caliper assembly with rubber seals Also, replace the brake pads and assemble the wheel Add the brake fluid in 18. reserve tank 19. Carry out brake bleeding operation after adjusting friction pads 20. Test the working of brakes.
Brake Fluid Level Top Up	1. Wash the vehicle 2. Check the brake fluid level in the master cylinder through inspection window. 3. If the brake fluid level is below the minimum mark, remove 2 nos. Phillips head screws and remove master cylinder reservoir cover. 4. Take out plastic cover and diaphragm. 5. Check rubber diaphragm for damages 6. Top up the oil level by pouring the DOT 3 / DOT 4 brake fluid in the master cylinder reservoir till the level is above the minimum mark 7. Refit the diaphragm, plastic cover and master cylinder cover. Tighten the screw securely. 8. Check the condition & routing of the brake hose pipe.

	Note: • Use DOT3 / DOT4 brake fluid from a sealed container. • Ensure no leakage of brake fluid through brake hose / banjo bolts / caliper assembly. • Carry out air bleeding if required.
Brake Fluid Replacement	1. Clean the surface area of master cylinder 2. Drain the brake fluid from caliper air bleeder bolt. 3. Tight the air bleeder bolt on caliper assembly. 4. Remove reservoir cover by removing 2 nos. phillips head screws. 5. Remove PVC Cap & rubber diaphragm. 6. Fill the master cylinder reservoir by using or DOT-3/DOT4 brake fluid. 7. Conduct the brake bleeding procedure & maintain the brake fluid level above MIN. mark. 8. Fit the master cylinder cover. 9. Press the front brake lever and check the operation of disc brake. 10. Perform air bleeding of disc brake system if the brake operation is spongy. • A Remove rubber cap from caliper's bleeder screw. • Fit a proper tube which fits snugly tight on the bleeder screw nipple. • Insert ring spanner through the pipe fitted on the bleeder screw nipple. • Connect the tube to siphon pump's pipe and loosen the bleeder screw by the ring spanner. • Press the bellow of the Siphon pump in its valve open position. Then close the valve of the pump and release the bellow. Simultaneously press the brake lever to take out air trapped in the system. Carry out the same proc dure until the entire air trapped in the system gets removed. • During this process continuously monitor and maintain the brake fluid level in the master cylinder reservoir slightly above the minimum mark. 11. For drum brake vehicles, check and adjust front brake lever free play. It should be 4 to 5 millimeters for all motorcycles. 12. Ensure front wheel is rotating freely. **Note:** • Use only DOT-3 / DOT-4 brake fluid from a sealed container. • Ensure no leakage of brake fluid through brake hose / banjo bolts / caliper assembly.

Tab: 2.3.15.3 Overhauling Hydraulic Disc Brake

Fig: 2.3.15.3 Changing Hydraulic Disc Brake Pads

2.3.15.4: Brake Bleeding Process

Brake Bleeding:
Process of removing trapped air from the fluid line is called 'bleeding 'otherwise, it may cause spongy brakes.

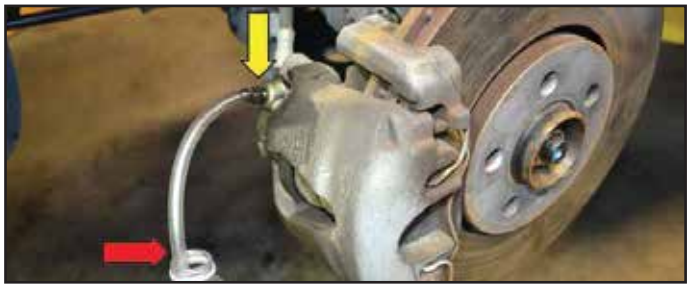


Fig: 2.3.15.4 Brake Bleeding

Title of the sub-task	Description
Bleeding	1. Fill the master cylinder's reservoir with brake fluid up to top as level marked on it. 2. Ask the companion to sit on driver's seat and create fluid pressure by pressing and releasing the brake pedal several times. You will feel that the pedal became hard. 3. Asked the companion to keep up foot pressure on brake pedal. Insert one end of the pipe's over the bleeding nipple and let the other end in a glass bottle / jar. 4. Release the fluid pressure by opening the bleeding nipple and farther most wheel cylinder from master cylinder. There will be bubbles with brake fluid coming out in the bottle/jar. 5. Tighten the nipple and the brake pedal goes to floor board as air and brake fluid are released from the nipple. 6. Again ask your companion to repeat the procedure and release the pressure through the same nipple. This time there should be no bubbles and only the brake fluid should be coming out of it. 7. Check the fluid level, it will be bit down, then top-up the level. 8. Apply the same steps to other wheel cylinders also, turn by turn. 9. Checked the free play of brake pedal. 10. Adjust the free play by unthreading the push rod. 11. Test the vehicle for road worthiness. All the four wheels should have the same grip as this ensures a good brake.

Tab: 2.3.15.4 Brake Bleeding

Important note:

Bleeding operation is to be carried out on the wheel cylinder which is farthest from the master cylinder. If the master cylinder is provided with bleeder valve and bleeding to be carried out first on the master cylinder.
Bleeding operation can also be carried out with the help of pressure bleeder machine.

2.3.16: Wheel and Tyre

Wheels:
The wheel is an important component of a vehicle. Wheel is assembly of hub, disc or spokes, rim, tyre and tube. The job of wheels is to support vehicle weight and also protect the vehicle from road shocks.

Fig: 2.3.16.1 Tyres

Tyre:
The tyre is mounted on the wheel rim. It has to carry the vehicle load and provide a cushioning effect

Types of tyres:
Tyres may be of the following types:

1. Tube tyre: Tube tyre is the traditional tyre. It encloses a tube in which air is forced to high pressure as a cushioning medium. The outer section of the tyre is made of synthetic rubber and is called tread rolls. This section of the tyre is basically rolling on the road. In the inner section of tyre with the reinforcement of steel wires beads are formed. The beads act as strong shoulders, for bearing against the wheel rim. Rayon cords are formed into a number of piles. Where the beads and cords give strength to the tyre, the threads provide resistance against slipping and thicker surface at the outer periphery.

Fig: 2.3.16.2 Different Types of Tyres

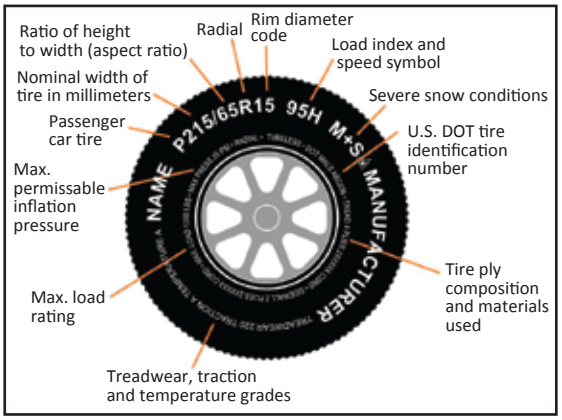


Fig: 2.3.16.3 Parts of a Tyre

2. **Tubeless tyre:** Tubeless tyre does not enclose the tube. The air under pressure is filled in the tyre itself. The inner construction of this tyre is almost the same as that of the tube tyre. A non-return valve is fitted to the rim through which the air is forced inside the tyre.

Advantages of tubeless tyre:

- The tubeless tyres are lighter and run cooler than tube tyre.
- Advantage of using a tubeless tyre is after getting punctured by nail or any thin sharp object it maintain fairly good air in tyre so that vehicle can be driven to repair shop. This tyre can retain air only on the condition that nail is note removed from the tyre.
- Puncture in the tubeless tyre can be repaired by using rubber plugging.
- Ordinary punctures can be repaired with removing the tyre from the wheel.
- It can be retreated in the same manner as the tube tyre.

The tubeless and tube tyres are called pneumatic tyres, in which the air is forced inside the tube itself or in a tube which is fitted in the tyre. In both the cases, air is the cushioning medium. But in solid tube, it is not so. Neither the air is forced inside the tyre nor the tube is enclosed inside it. The tyre is completely solid and is mounted on the wheel rim. It runs for a life long time. Because, it is a heavy tyre and there is no chance of being punctured. Once it is heavy and does not provide cushioning effect, it is not used on automobiles. Its use is limited to children's tricycles.

Types of wheels:

Following types of wheels are used in automobile

- Disc wheels
- Light alloy cast or forged wheels
- Alloy wheels

Disc wheels: These type of wheels consist of two parts, steel rim which is generally well-based to receive the tyre and pressed steel disc. Steel disc is welded to the rim. It is light in weight. It is used in heavy vehicle like trucks, buses etc.

Light alloy cast or forged wheel: These type of wheels are used for the cars. Wheels are made of aluminum alloy which is a better conductor of heat, which disperses heat in application during rolling wider rim improves stability on cornering.(while taking a turn).

2.3.17: Servicing Drive Chain of Motor Cycle

The drive chain life depends on proper adjustment and required lubrication. Thus it become very important to mind a proper maintenance as failure to that can lead to drive chain and sprockets damage. The drive chain needs to be periodically lubricated. If the vehicle is in high use or ridden in very dusty area it needs more frequent maintenance.

Fig. 2.3.17 Servicing Drive Chain of Motorcycle

Title of the sub-task	Description
Servicing Drive Chain	1. Put vehicle on center stand. 2. Remove rubber cap from chain inspection window. (Applicable for non 'O' Ring Type Chain) 3. Rotate rear wheel to find out the position at which chain is getting tight. 4. Measure chain slackness by steel rule by pulling up and pushing down the chain to find out maximum slackness. 5. To set chain slackness, first loosen the rear brake rod nut by using a flat or ring spanner. 6. Remove the lock pin by using combination plier and loosen the tie rod nut by using ring spanner. 7. Loosen the bearing carrier nut by using ring spanner. 8. Check & confirm that the marks on left hand & right hand chain adjusters are equally placed. 9. To keep the chain & rear wheel properly aligned, the arrow mark on the left and right adjusters must be equidistant from their respective rear edge of 'swing arm notch'. 10. Hold the left chain adjuster nut in flat spanner and tighten the lock nut. 11. Repeat the same procedure for right chain adjuster lock nut. 12. Rotate the rear wheel and apply rear brake so that the brake panel takes its own position. 13. Tighten the bearing carrier nut to the specified torque. 14. Tighten the rear axle nut to the specified torque.(refer training notes for model wise specs. 15. Tighten tie rod bolt to specified torque & refit the lock pin. 16. Adjust rear brake pedal free play. Recommended rear brake pedal free play is 25 to 30 mm. 17. Check and ensure that rear wheel is rotating freely.

Tab: 2.3.17 Servicing Drive Chain of Motorcycle

2.3.18: Two and Three Wheeler Specification

Now a day almost of the Indian cities are overcrowded with the vehicles such as car, SUV, auto, truck motorcycle, truck, bus etc and it is also increasing consistently with a higher rate.

Every new vehicle comes with a vehicle maintenance manual. Vehicle owner should read and use this manual. This manual helps user for vehicle maintenance tips during driving. People after getting a car or vehicle often care little about regular car maintenance.

Although even after regular service is performed on your vehicle still it becomes important for you to go through the given in vehicle maintenance manual as it will be helpful in long lasting of your vehicle.

The process of vehicle maintenance and servicing is based on the guidelines given by vehicle manufacturer. These guidelines mainly follow Kilometer principle or a certain time frame. Maintenance process can also be done in case the performance of the vehicle is hampered. Thus a regular and periodic checkup is the sole responsibility of the vehicle owner to maintain the vehicle in good running condition. Some of checks are given her for users.

Daily Inspection (DI):

- Visual inspection to all tyres to check the pressure and also observing the sound of tyre while hitting it with stone piece
  - Check coolant level in radiator.
  - Check intactness of fan belts.
  - Check engine oil level.
  - Check the wind screen, rear view mirror and rear window glass for their cleanliness.

Maintenance Checkup:

While planning a outstation trip or longer distance it become necessary for the vehicle owner to do some routine checkup. For a better clarification what needs to be done and what needs to be checked follow the user manual. Few important checkup can be easily carried out by the owner for better maintenance.

1. Oil level topping
2. Intactness of Belt
3. Cleanliness of battery for and electrolyte level
4. Functioning of brakes
5. Level of coolant in the coolant reservoir
6. Cooling system hoses intactness
7. Tyre pressure

Basically maintenance or checkups of vehicle is carried out vehicle service centre but it is also your responsibility to be familiar about checkups and maintenance process thus you need to sometime visit to nearby vehicle service centre.

As a part of this course participants needs to visit nearby service centre to understand how the service mechanics is doing common checkup. Few key checkup are explained here:

Check and Top up all oil levels : This job can be performed either by visual inspection by opening the oil container if required for coolant, brake oil and water but for the engine oil it can be done using dipstick which helps in measuring oil level. If required get the top up done as soon as possible except water you need to visit service centre.

- Do not put sharp objects, such as screw drivers, in your pocket. You could cut yourself or get stabbed, you could damage the seat.
- Make sure that technician should use proper shoes and their dress should be as per job requirement.
- If oil, grease, or any liquid spill on the floor, clean it up so that no one will slip and fall.
- when using a grinding wheel wearing eye protection is must or welding equipment or working with chemicals-such as solvents.
- While using jack, place it properly to avoid slip.
- Never run an engine in a closed garage that does not have proper ventilation system.
- The exhaust gases contain carbon monoxide. Carbon monoxide is a colorless, odorless, tasteless poisonous gas that can kill you.

Fig: 2.3.18.1 Service Centre

Fig: 2.3.18.2 Checking Oil Levels

2.3.19: Oil Pressure

For better life of engine oil pressure plays an important role. Lubrication system pick the oil using oil pump and forced through oil galleries (passageways) into bearings, such as the main bearings, big ends and balance shaft or camshaft bearings. Oil jets are lubricating cam lobes and cylinder walls.

During cold stage of engine, pressure of oil is higher because viscosity of the oil is increased and engine speed is also increased till the relief valve in the oil pump opens to divert excess flow. During hot idling stage, oil pressure is lowest and at this point applied pressure is based on manufacturer's tolerances. If the oil pressure is high it reflects either blockage in filter or oil gallery is blocked or incorrect oil. If the pressure of oil is low it reflects bearings are worn out or might be oil pump is broken.

2.3.19.1: Oil Pressure Test

Oil Pressure Test:

Oil pressure is an important criterion for the maintenance of engine to provide a better vehicle life. Oil pump is picking oil from oil pit and through using forced lubrication system oil is forced through oil passage-ways into various engine components like all main bearings, camshaft bearing etc. Oil jets are lubricating cam lobes and cylinder walls.

Due to increased viscosity of the oil, during cold stage of engine pressure is high. It further increases with the speed of engine until oil pump relief valve is open for diverting excess flow of oil. During hot idling stage pressure of oil is lowest and at this point applied pressure is based on manufacturer's tolerances. If the oil pressure is very high it indicates following issues: filter is blocked, oil gallery may be blocked or wrong grade of oil whereas if the oil pressure is low it indicates bearings is worn

Title of the sub-task	Description
Oil pressure test	Steps to be followed during testing fuel pressure 1. Read the service manual of the engine that the gauge will be testing. 2. During engine testing process vehicle should be parked on a level surface, it should be in neutral gear with front brake applied and chocked wheels. 3. The oil pressure / temperature sensor is usually located on or near the oil pan at the lower part of the engine. Clean the area thoroughly before proceeding. 4. Only connect the gauge when the engine is off and cool 5. Place a pan below the sensor to store oil, remove the sensor, and thread the gauge into the opening 6. Attach the appropriate fitting to the gauge 7. Check the oil level and fill as needed 8. Start the vehicle and allow it to come to normal running temperature. 9. Compare the reading on the gauge to the numbers on the chart. If the actual reading is lower or higher than the numbers indicated on the chart have the engine needs to be serviced. 10. Turn the vehicle off and allow it to cool before removing the gauge 11. Replace the oil pressure/temperature sensor, refill oil as necessary 12. Clean, and then store the tool properly

Tab: 2.3.19.1 Oil Pressure Test

Fig: 2.3.19.1 Gauge to Check Oil Pressure

2.3.20: Dismantling Wheel Baring

Title of the sub-task	Description
Dismantling the wheel baring	1. Secure the vehicle on a flat rigid floor. 2. Loosen the break by loosening the brake lock nut 3. Remove the wheel using DE spanner 4. Remove the break shoe, remove the wheel and pull out the bearing shieid. 5. Remove the ball bearing using suitable plier/puller. 6. Clean the bearing thoroughly with kerosene and allow it to dry (care should be taken not to dry the bearing with s to compressed air as the air may contain moisture which is harmful to the bearing. 7. Test the bearing manually by rolling and check for any noise, pay. 8. Lubricate the bearing with recommended grease and once again check for any noise or distortion if noise still persists it indicates the balls have worn out and bearing is to replaced.

Tab: 2.3.20 Dismantling Wheel Baring

2.3.21: Vehicle Washing and Cleaning

Regular cleaning and washing the vehicle helps in keeping the vehicle looking nice and clean and also give a better feel while driving. For protecting exterior of the vehicle from dirt, oil and debris damage and also offering a better maintenance it becomes extremely important vehicle should be washed periodically or as and when required.

Fig: 2.3.21.1 Washing Two Wheeler

Fig: 2.3.21.2 Man Washing an Auto

2.3.21.1: Interior and Exterior Cleaning

Sub Titles	Description
Interior and Exterior Cleaning	1. Cover tail end of silencer with PVC cap to avoid water entry in silencer Caution: Vehicle washing without covering silencer tail end will result in water entry into silencer causing rusting of silencer. 2. Set water washer pressure for vehicle washing is 25 bar max.& set the nozzle in spray mode.. 3. Clean the exterior surface of engine metal parts by diesel or kerosene with soft nylon brush 4. Dismantle the small chain cover & clean the area between magneto cover & engine sprocket by using nylon brush and kerosene or diesel 5. Wash the vehicle by keeping nozzle 2 meters away from parts 6. Adjust nozzle to jet mode & wash under the front & rear mudguard to remove the mud & dirt. 7. Clean painted parts by gently rubbing their surface with solution of mild car shampoo / liquid solution. 8. Rub the front & rear tyres by nylon brush to remove dirt & mud. 9. Water wash the vehicle with the nozzle in spray mode & clean all soap & shampoo foam. 10. Dry the vehicle by using low pressure (2 bar) compressed air. 11. Vehicle should be wiped off by cotton cloth immediately after washing. 12. To avoid water entry & paper filter ,do not apply water on area beneath seat.

Tab: 2.3.21.1 Interior and Exterior Cleaning

2.3.22: Check Speedometer Cable & Worm Gear

Check speedometer cable & worm gear

Speedometer is used to know a vehicle speed / wheel speed, its classified different types- Analogue and digital.

Fig: 2.3.22 Speedometer

Work cycle

Title of the subtask	Description
Replace worn out gear / speedometer cable	1. Rotate the front wheel in the forward direction 2. If the speedometer moves to a few distance then it is alright 3. If the speedometer in not moving then check cable 4. The cable might be loose. Tighten then both near the speedometer. 5. If the worn gear is worn-out the speedometer oscillates. 6. Replace gear arrangement 7. Lubricate the gears and the cable.

Tab*: 2.3.22 Replacement of Speedometer Cable*

2.3.23: Periodic Maintenance Service

Periodic maintenance service:

Automobiles need periodic maintenance. Like we need to wash, bathe similarly our automobiles should be kept clean. Automobiles have to run on dirty roads and in polluted environment. Automobiles also run on uneven roads with pot holes and other obstructions.

Load on automobile makes them either damaged or in poor working condition. Therefore, there is need for regular maintenance and servicing of automobiles. Automobile service and maintenance activities are carried out Auto Workshop or Auto Service Station.

Title of the subtask	Description
Maintenance Check-up	1. Topping of oil level 2. Proper tension of Belt 3. Battery for cleanliness and level of electrolyte (Add only distilled water for topping of electrolyte water) 4. Brakes 5. Toping up of Coolant if required in the coolant reservoir 6. Check the Serviceability of cooling system Hoses 7. Proper Tyre inflation pressure 8. Air-conditioning
Service at work shop	Vehicle maintenance/check-up is generally done at vehicle service centre. You must visit to nearby vehicle service centre and see how a vehicle is being properly maintained. We will be visiting a nearby vehicle service centre and see the how the common checkups are being made by service mechanic. Some of important check-up are discussed here: Check/Top up all vehicles' oil levels: Service mechanic with the help of measuring stick check the engine oil, coolant, brake oil, and water. During routine check-up, oil, water, coolants are topped up otherwise it is changed.

Tab*: 2.3.23 Periodic Maintenance Service*

2.3.24: Replacing Wiper

Replacing of wiper motor

For removing rain and debris from a windscreen the device used is called windscreen wiper. Having a wiper in the vehicle is also a legal requirement and it is getting used in all types of vehicle including aircraft, trains etc.

A wiper contains metallic arms, rotating from one end to other end with an attachment of rubber blade. The blade is placed on glass and swung back and forth to push the water away from glass. Movement speed of wiper can be adjusted using a liver near steering having option for multiple continuous speeds and "intermittent" settings.

Fig: 2.3.24 Wiper Motor

Title of the subtask	Description
Removing windscreen wiper motor	Lift out the motor and linkage together. Disconnect the wiper arms Unplug the electrical connections, and then remove the bolts holding the motor to the bulkhead Before removing a pushrod system, mark the angles of the rods to aid refitting.
Refitting wiper motor	When reassembling a pushrod linkage, use the guide marks you made to position rods at the correct angles. Once the motor is back in place, test the wipers with the blades lifted off the screen. Wet the screen with the washer and test the blades in different wiping position. Take the wiper arms off from their spindles and realign them. Some motors have an adjuster nut for adjusting the parking position

Tab*: 2.3.24 Placement of Wiper Motor*

2.4: Skill: Automotive Technician

A. Core / Generic Skills:

2.4.1: Writing Skills

- Record and document the basic details of repairs and maintenance performed on various aggregates / components
- Record all diagnostics done by senior technicians as per the prescribed format recommended by the OEM / auto component manufacturer
- Write legibly in at least one language

2.4.2: Reading Skills

- Read the basic specification of a vehicle or any other component or part
- Read work orders, specifications etc. related to the job including instructions mentioned on the job card
- Read the service circulars / sign boards placed in the workshop with respect to the overall process to be followed for service, repair and maintenance of the vehicle
- Read any specific safety related guideline (applicable for CNG / LPG / Electric vehicle)

2.4.3: Oral Communication (Listening and Speaking Skills)

- Interact with customer / service advisor and senior technicians
- Interact with team members including colleagues in the workshop to work efficiently

2.4.4: Professional Skills

Decision making:

- Judge when to seek assistance from a superior
- Decide on the level of top up required of various lubricants / oil / coolant / grease for routine maintenance of the vehicle after judging the current levels

Plan and organize:

- Plan work according to the required schedule and location
- Organize the schedule to complete the work on the vehicle timely in case other aggregate repairs / maintenance work is also required to be done
- Organize the workplace and work according to the principles of 5S

Customer centricity:

- Ensure that customer needs are assessed and every effort is made to provide satisfactory service

Problem solving:

- Assist in repairs under the supervision of the senior technician
- Bring any noticeable issues (both in the aggregates currently working or any other aggregate on which there is no work to be done) to the attention of the supervisor

Analytical thinking:

- Evaluate the complexity of the tasks to determine if he / she needs any assistance from the senior technician

Critical thinking:

- Analyse, evaluate and apply the information gathered from observation, experience, reasoning or communication to act efficiently

Notes

Exercise-1: Mark True or False

1. Auto service technician is responsible for the routine servicing of two / three wheeler

A. True B. False

2. Good communication and interpersonal skills is required for the auto service technician

A. True B. False

3. Auto service technician should have a better understanding of social aspect for repairing the vehicle

A. True B. False

4. After collecting the vehicle customer's personal belongings in the vehicle should be handover to service agency office

A. True B. False

5. Job card can be filled in absence of customer

A. True B. False

Exercise-2: Fill in the Blanks

1. During vehicle booking appointment is taken by the ..... from the customer for the service job.

A. Service advisor B. Workshop supervisor C. Technician

2. Vehicle receiving and job card opening process is done by .....

A. Service advisor B. Workshop supervisor C. Technician

3. Job allotment in the workshop is done by.....

A. Service advisor B. Workshop supervisor C. Technician

4. During repairing process if additional job has to be done on the vehicle, should be intimated to .....

A. Service advisor B. Workshop supervisor C. Technician

5. Final inspection of the vehicle before delivery is done by …….

A. Service advisor B. Workshop supervisor C. Quality tester

6. Service technician should carry out repair jobs as per ……

A. Job card B. Customer input C. Advice from quality tester

7. The job card has details of……

A. customer B. vehicle C. Instruction of service advisor

8. Junior technician gradually learn to do complex repairs from ……

A. Service advisor B. Workshop supervisor C. Senior technician

9. …….. should help the supervisors with the road tests and diagnosis when needed.

A. Service advisor B. Junior technician C. Senior technician

10. Invoicing and vehicle delivery is responsibility of

A. Service advisor B. Workshop supervisor C. Senior technician

Exercise-3: Answer the Following Questions:

1. What is the Role and responsibilities of a Technician?

_____

_____

_____

_____

2. What are the stages of service process?

_____

_____

_____

_____

Exercise-4: Fill in the Blanks

1. The auto components industry is predominantly divided into .....

A. 2 segments B. 4 segments C. 5 segments

2. The primary function of the vehicle chassis is .....

A. To carry the weight of the vehicle and its passengers

B. To carry the weight of vehicle

C. To carry weight of passengers

3. The two wheelers frame consists mostly of .....

A. Solid tubes B. Hollow tubes C. Semi solid tube

4. A ..... design is the most common solution for the rear suspension

A. Swing arm B. Rare arm C. Front arm

5. Cast wheels allow the bikes to use .....

A. Pneumatic tyres B. Tubeless tyres C. Hollow tyres

6. Disc brakes consist of a ..... disc

A. Steel braking B. Copper braking C. Brass braking

7. Disk brakes works on .....

A. Pneumatic pressure B. Hydraulic pressure C. Both

8. Engine converts the ..... energy to mechanical energy

A. Chemical B. kinetic C. Thermal

9. Almost all automotive engines are using .....

A. Rotary engine B. Reciprocating engine C. Both

10. Reciprocating engine is called .....

A. Piston engine B. External combustion engine C. Both

Exercise-5: Answer the Following Questions:

1. Write down different types of engine?

_____

_____

_____

_____

2. What are the major components of automobile?

_____

_____

_____

Exercise-6: Fill in the Blanks

1. Transmission systems supply the output of the internal combustion engine to the .....

A. Drive wheel B. Front wheel C. All wheels

2. The transmission system reduces the higher engine speed to the slower .....

A. Engine speed B. Wheel speed C. Both

3. The transmission system consists of ..... components

A. 3 B. 2 C. 4

4. Clutch is a mechanism which enables the rotary motion of one shaft to be transmitted .....

A. Always B. When desired C. Automatically

5. We need different gear ratios in the gear box or transmission system to enable the vehicle move in .....

A. Different speed B. Consistent speed C. Higher Speed

6. Camshaft is a component of .....

A. Engine B. Shaft C. Gear

7. The axle has to take bending loads due to load of the vehicle and also torque loads due to braking of the wheels .....

A. Passenger load B. Torque load C. Vehicle load

8. Steering system consists of steering column and ..... to allow it to deviate somewhat from a straight line

A. Universal joints B. Bewail joints C. Column joint

9. Steering system absorbs a major part of the road shocks thereby preventing them to get transmitted to the ..... of the driver

A. Body B. Legs C. Hands

10 ..... is used safeguard the occupants against road shocks and provide riding comfort

A. Suspension system B. Steering system C. Braking system

Exercise-7: Fill in the Blanks

1. Wheels are strong enough to withstand the ..... of the vehicle

A. Height B. Weight C. Both

2. Wheels are able to grip the ..... surface

A. Road B. Tube C. Both

3. ..... transmit the power from the engine through gearbox propeller shaft and rear axle to the ground with which the vehicle moves

A. Wheels B. Tyre C. Tube

4. The treads made on the tyres ..... for better traction

A. Grip the road B. Protect the road C. Protect the passenger

5. Brakes are one of the most important ..... components of a vehicle

A. Transmission B. Control C. Body

6. The function of an Automobile is mainly dependent on its ..... performance

A. Transmission B. Braking C. Engine

7. Distance travelled by the piston in moving from T.D.C. to the B.D.C is called .....

A. Bore B. Stroke C. Top dead centre

8. Total piston displacement or the Swept volume of all the cylinders is called .....

A. Stroke B. Clearance volume C. Engine capacity

9. The turning force required to turn or twist any object is called .....

A. Bore B. Stroke C. Torque

10. Piston travel from top dead centre to bottom dead centre or bottom dead centre to top dead centre is called .....

A. Bore B. Stroke C. Torque

Exercise-8: Fill in the Blanks

1. Hollow punches are designed to ..... a surface

A. Correct B. Puncture C. Recover

2. A drilling machine is a tool used for drilling holes in various types of .....

A. Wood B. Plastic C. Wood, plastic and metal

3. The pillar drill is a ..... version of the bench drill and has a long column enabling it to stand on the floor

A. Larger B. Smaller C. Medium

4. Along with the mallet, ... shares the ability to distribute force over a wide area

A. Hammer B. Hand-sledge C. Chisel

5. Brakes are one of the most important ..... components of a vehicle

A. Transmission B. Control C. Body

6. ..... is a socket wrench power tool designed to deliver high torque output with minimal exertion by the user

A. Impeller-wrench B. Impact-wrench C. Important-wrench

7. ..... supplies heat to melt solder so that it can flow into the joint between two work pieces

A. Soldering gun B. Soldering iron C. Soldering rod

8. A ..... is a tool used to precisely apply a specific torque to a fastener such as a nut or bolt

A. Impeller-wrench B. Impact-wrench C. torque wrench

9. A reamer is a type of rotary ..... tool used in metalworking

A. Finishing B. Cutting C. Removing

10. ..... is a device widely used in mechanical engineering for precisely measuring thickness of blocks, outer and inner diameters of shafts and depths of slots

A. Multimeter B. Micrometer C. Megameter

Exercise-9: Answer the Following Questions:

1. Write are the major generic tools and equipments used in automobile service?

_____

_____

_____

_____

2. What are the measuring tools used in automobile?

_____

_____

_____

Exercise-10: Fill in the Blanks

1. The Evaporative Emission Control System (EVAP) is used to prevent ..... vapors from escaping into the atmosphere from the fuel tank and fuel system

A. Carbon dioxide B. Gasoline C. Carbon monoxide

2. The device prevents liquid gasoline from entering the vent line to the EVAP canister .....

A. Liquid-vapor separator B. Gas cap C. Liquid fuel separator

3. During the interval- from one oil change to the next oil change, engine oil consumption quantity should not be more than ..... per 1000 Kms.

A. 20 ml. B. 100 ml. C. 50 ml.

4. The system which is based upon the simple fact that the engine suction can be used for sucking fuel from the main tank to the auxiliary fuel tank from where it flows by gravity to the carburettor float chamber is called .....

A. Pump System B. Vacuum System C. Fuel Injection System

5. In four-stroke cycle engines the valve timing is controlled by the .....

A. Carburetor B. Camshaft C. Powershaft

6. Helps to reduce friction by creating a thin film between moving parts .....

A. Lubrication system B. Fuel system C. Both

7. ..... System helps in constant engine operating temperature

A. Lubrication system B. Cooling system C. Fuel system

8. ..... deliver the correct amount of fuel to keep the fuel/air mixture in the proper range.

A. Carburetor B. Camshaft C. Clutch

9. Process of removing trapped air from the fluid line of breaking system is called .....

A. Evaporation B. Bleeding C. Bending

10. The service life of the drive chain is dependent upon proper ..... and adjustment

A. Maintenance B. Cleaning C. Lubrication

Exercise-11: Answer the Following Questions:

1. Write are the various components of air induction system?

_____

_____

_____

_____

2. Write are the various components of air fuel supply system?

_____

_____

_____

3. Write are the various components of lubrication system?

_____

_____

_____

4. Write are the various components of suspension system?

_____

_____

_____

5. Write are the types of breaking system and their components?

_____

_____

_____

Assignments

- Fill the vehicle check list for any two wheeler vehicle.
- Identify and practice various tools used in diagnosis of vehicle
- Identify and practice various tools used in repair work of vehicle
- Identify and locate major component /sub-assemblies of vehicle
- Practice dismantle process of given engine
- Practice assembly process of given engine
- Check the compression pressure in the given engine as per the procedure
- Practice changing of engine oil & oil filter of a vehicle
- Check and adjust the valve clearance in the given engine
- Demonstrate service process of air filter
- Demonstrate service process of fuel filter
- Practice servicing process of carburettor
- Practice servicing process of exhaust tail pipe from the vehicle
- Demonstrate the battery testing process to rule out any possible damage
- Check battery voltage using multi meter
- Check battery charge level using hydrometer
- Practice cleaning and overhauling of mechanical brake
- Practice cleaning, adjustment and replacement of drive chain
- Practice servicing of strut and shock absorber
- Practice dismantling & assembling of wheels
- Check and replace wheel bearing of a vehicle
- Practice overhauling process of hydraulic disc brake

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AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

3. Plan & Organize Work to Meet Expected Outcomes

Unit 3.1 – Performance criteria for Planning & Organizing Work

Unit 3.2 – Knowledge &Understanding: Planning & Organizing Work

ASC/ N 0001

Key Learning Outcomes

At the end of this module, you will be able to:

1. Perform the job within given time as per quality standards / work schedule
2. Identify and manage resources and use it efficiently and effectively
3. Perform in accordance with the organizational policies and procedures
4. Manage your time effectively at work
5. Apply best practices to keep your workplace clean
6. Acquire knowledge and understanding required for planning & organizing

UNIT 3.1: Performance Criteria for Planning & Organizing Work

Unit Objectives

At the end of this unit, you will be able to:

1. Perform the job within given time as per set quality standards / work schedule
2. Identify resources and use it efficiently and effectively

3.1.1: Introduction

Work requirements including various activities within the given time and set quality standards :

- Keep immediate work area clean and tidy
- Learn, understand and implement the principles of " 5 S "

Fig: 3.1.1: 5s Steps to World Class

- Treat confidential information as per the organization's guidelines
- Work in line with organization's policies and procedures Work within the limits of job role
- Obtain guidance from appropriate people, where necessary
- Ensure work meets the agreed requirements

3.1.2: Appropriate use of Resources

- Establish and agree on work requirements with appropriate people
- Manage time, materials and cost effectively
- Use resources in a responsible manner

UNIT 3.2: Knowledge & Understanding - Planning & Organizing Work

Unit Objectives

At the end of this unit, you will be able to:

1. Perform as per the organizational policies and procedures
2. Manage your time effectively at work
3. Apply best practices to keep your workplace clean

3.2.1: Organization Policy & Procedures

Most of the organizations usually formulate set of policies, principles and guidelines to reach long term goals. This formulated content is mainly published in a booklet or in other form so that it can widely reach to the people of organization.

The policies and procedures are designed by the organization to control and establish decisions. This help the organization to take corrective action and activities within the organization take place with the set boundaries. To decide action in day to day operation of the organization explicit methods are defined to express policies. Policies and procedure together ensures that governing body view should be translated in step by step manner which will result in outcome compatible with that view.

A policy is a set of define rules that help in dealing with human management issues within organization. It communicates an organization's values and the organization's expectations of employee's behaviours and performance.

Workplace policies also strengthen and simplify SOPs (standard operating procedure) in a workplace. With the help of proper policies employers can manage the people in the organization more efficiently as it clearly spell out acceptable and unacceptable behavior in the workplace. This also has to ensure that there is no implication complying with those policies. Basically workplace policies define the purpose and guidelines to follow for achieving the purpose. This has to be written in simple language so that it can be understand easily. Policy length will depend on the issue it is addressing.

There should be certain diplomacy in the implementation of policy and this diplomacy should be clearly declared as a part of policy. Policy may also be required wherever there is mixture of interest and preference as this may result in conflict within the organization specially to those who will be directly involved.

Not all workplace issues require a policy. For dealing with regular matter a simple procedure for work-place procedure can be put in place.

Every company has different policies and procedures. Company should explain its policies and procedures to their employee in detail within first week of employment.

Once the first day of employment employee should be given all the details which should outline what the company is expecting from employee in terms of behavior, dressing and leaves etc are concerned. It is good to keep it on hand to refer to it when questions arise about what the company allows and doesn't allow.

3.2.1.1: Benefits of Organizational Policies & Procedures

The key benefits of organizational policies and procedures are they:

- Help us comply with employment and other associated legislation
- Ensure uniformity and consistency in decision-making and operational procedures
- Save time when a new problem can be handled quickly and effectively by following existing policy
- Provide the support system for business planning
- Assist in performance assessment and strengthen accountability
- Clarify functions and responsibilities
- Help employees know what is expected of them with respect to standards of behaviour and perfor mance
- Set rules and guidelines for decision-making in routine situations so that employees and managers do not need to continually ask senior managers what to do
- Help us to adopt a consistent and clear response across the company to continually refer to situations involving employee interaction
- Allow us to demonstrate good faith that employees will be treated fairly and equally

3.2.1.2: Common Workplace Policies Examples

The common examples of workplace policies are:

- Code of conduct
- Recruitment policy
- Internet and e-mail policy
- Mobile phone policy
- Non-smoking policy
- Drug and alcohol policy
- Health and safety policy
- Anti-discrimination and harassment policy
- Grievance handling policy
- Discipline and termination policy

Fig: 3.2.1.2 Common Workplace Policies Examples

3.2.1.3: Work According to Organization Policies & Procedures

Organizations will have a set of rules that direct employees' action in accordance to what is believed to be right. One should follow the policies set by the organization.

The meaning of working ethically means you should be on pre-define shift time, should take leave when you are sick, not using the telephone for personal purpose, avoid gift from customers, should not use anything belong to customer, should not indulge in gossiping about others behind them, showing support to other workers and keeping client information confidential. In the workplace it is important to always behave in an appropriate way and report any problems to your supervisor.

3.2.1.4: Work According to Organization Policies & Procedures

When you work in any organization, you have particular tasks to do as part of your job. If you work within the roles, responsibilities and boundaries of your job description, you will also be working in line with the organization's beliefs and values.

The tasks you do in your job are directed by:
- Your job description
- Codes of practice, regulations and laws
- Workplace policies and procedures

All these documents are written to reflect the beliefs and values of your organization

Fig: 3.2.1.4 Work Within the Limit of Your Job Roles

The organization's beliefs (or philosophy) are its main goal or aim. The goals worked out by the people who start the service and should describe the reason the service was first set up or the reason the service exists. For example, the service may exist to provide information and support to people with disabilities. The belief or goal of the service is supported by its policies and procedures.
Policies point out the general direction of the service, and the procedures are the step-by-step rules that direct how the policy will be put into place. As workers they need to support the organization's policies by following its procedures.

3.2.1.5: Work According to Organization Policies & Procedures

When you work in any organization, you have particular tasks to do as part of your job. If you work within the roles, responsibilities and boundaries of your job description, you will also be working in line with the organization's beliefs and values.

There are many ways that you can keep information private and confidential. For example:

- Do not use the person's full name if you are speaking to them on the telephone or talking to them in a public space such as a waiting room. Always be aware that other people may hear your conversation.
- Do not talk about customer or co-workers in social situations or give away information that might identify a person.

You should not share customer information with your co-workers without the customer's permission even though you work closely together and are employed by the same organization.

Always follow your organization's procedures about destroying private or confidential information. Make sure information not to be recycled – be locked away when they are not being used – are disposed of properly such as shredded.

All information provided by a customer, even in casual conversation, should be treated confidentially. Do not share organization's internal data or information to any outsider.

Fig: 3.2.1.5 Keep Organizational Information Private and Confidential

3.2.1.6: Guidance from Appropriate People

You may experience situations when you have problems doing your job well. Unexpected things can happen to change the day-to-day operations of an organization or workplace.

When you have difficulties in carrying out your duties, you need to report these problems to your supervisor. It is important that you report problems to your supervisor so that solutions can be found. In this way one can feel more comfortable and work efficiently.

3.2.1.7: Managing Time/Materials/Cost Effectively

Working effectively means doing your job without wasting time or energy. In your work you probably have a wide range of tasks to do. You need to clearly understand what is expected of you. For example, you may be the person who answers the phone, receive customers, etc. Your job description will describe the tasks you have to do. However, not everything that is expected of you will be written in the job description or other workplace documents.

You must have a clear understanding of what you are expected to do and you must also know how you should work with other team members.

3.2.2: Time Management

We achieve outcome of our 24 hours period based on our enthusiasm, energy levels, ability to perform, skills and other resources.
As our time is always in demand, we need to think about how to use our time and for more effective time management we need to consider certain strategies.
Time management does not means to work harder or for longer period but it help us to work smartly so that we can finish our work easily and quickly.

If we can manage our time more effectively, we will be rewarded in a variety of ways:
- We will be more competent in our routine job and also can support others in better ways.
- We can accomplish great success in every role as a leader.
- On a personal level, you will certainly feel healthier, more energetic, and in a generally better mood.

Fig: 3.2.2 Why Time Management?

3.2.2.1: Obstacles to Effective Time Management

There are many things that make it difficult for us to manage our time effectively. Let's consider some of the most common ones, and see if they apply to us:

Objective is not clear – With closed eyes it is difficult to hit a target thus it is equally difficult to accomplish something when you aren't exactly clear about what you want to achieve

Disorganization – It's easy to see when your desk is too messy, but sometimes you have to step back and ask yourself if you are taking an organized approach in completing all of your tasks.

Inability to Say "No" – We need to be helpful; towards others when they need our support, but this needs time and could result in disturbing our priorities to do something we may not have planned.

Interruptions – Some time it happens that when are in the middle of accomplishing something which is very important for, we get a phone call. These calls are very disturbing as it could play a import reason to be behind the schedule as it may interrupt our though process which can lead to go back from where we started or in between somewhere.

More Interruptions – Inappropriate time conversations need our time thus we need to be careful and have to stop what we are doing and focus on plans.

Periods of Inactivity – As much as we think we are busy, there are times in our day when we are not really doing anything. Recognizing and making use of these times can have a positive effect on our efforts.

Too Many Things at Once – Most of us work without making routine of our task as it needs our attention for detailing. When we try to do so many things simultaneously each individual task get suffer.

Stress and Fatigue – We all experience stress time to time in our daily life and we perform well with a little bit stress. If the level of stress is very high, our works get suffered and also effect mental and physical situation. How to deal with stress forms an important factor of time management.

All Work and No Play – Most successful people know how to balance work and play. When work takes over your life, you may end up sacrificing the really important things in life like family and friends. Therefore, give your body little time to re-energize and enjoy life.

3.2.2.2: How to resolve obstacles

The obstacle we face in our day to day life is not very difficult to resolve. The most important thing is to identify existence of obstacle which is affecting our ability in time management. After identifying the obstacle we start think solution to resolve it.

Let's now learn about some strategies you can use to overcome the obstacles you just examined.

3.2.2.3: Set Clear Goals

- As a Lions leader, you will want to accomplish many things in your time of office. The best favour you can do for yourself is to determine what those goals are and make sure your efforts are always directed toward their achievement.
- Effective goals share a number of characteristics in common. Effective goals are:
    - **Specific** – When a goal is too vague, you may never know how to reach it or even when you have reached it. Make sure that you know exactly what you hope to achieve.
    - **Measurable** – When you have a goal that is measurable, you will know how far you have to go to reach the goal, and when you will get there.
    - **Achievable** – It is admirable to set our expectation high but it is also true that some time we expect more than what actually we perform. Sometimes it is also become difficult to achieve while doing multiple task simultaneously. We should set our goal to reach them by extending our self.
    - **Realistic** – We need to be realistic while performing. For e.g. if we want that in our city everybody should be treated for vision problem, we should start first with identifying people with vision defect in a smaller locality then only we can achieve our goal for the city.
    - **Time-based** – Being on a position of a Lions leader we establish many goals but these goals are not long term goals. We need to set time guidelines for our goals. So that progress can be tracked which intern helps us to get alert when we are behind the schedule.

Fig: 3.2.2.3 Set Clear Goals

3.2.2.4: Prioritize

As a leader in your organization you will be assigned many tasks. It is always good and safe to clarify that you cannot do everything, thus it is important to make a list of tasks periodically that confront you and prioritize them. Below mentioned technique may help in prioritizing:

- **Do** – Choose most important task from the list which you consider as important for your organization. These are the task you need to do yourself.
- **Delegate** – There could be many persons in an organization who possess various skills and experience to carryout variety of task. A real leader understand it very clearly that they cannot accomplish everything by themselves. Thus they recognize someone who can better handle the task. Delegating not only helps to free up your time so that we can do other works but also ensures resources applied can be used more effectively through certain degree of motivation.
- **Delay Until another Time** – As a regular process we think something can wait and applying same thinking on too many things close to the dead line which creates a dangerous situation. It is always good to consider when things are due, how long it will take to accomplish and your current workload. Suppose you have to pay for your policy but still have time you can delay it but when it comes to deadline it may hamper your working process.
- **Delete** – If we set our goals as explained earlier, we will experience that some of these goals are not achievable or realistic, or that they are just not important. A good leader knows when to concentrate on the important and eliminate the rest.

When you prioritized your task it is important for you to:

- **Address the Urgent** – Things having short-term consequences should be tackled first.
- **Accomplish What You can Early** – Reports, registrations and requests that can be handled early should come next. Don't put off until tomorrow what you can do today.
- **Attaching deadlines to things we delayed –** When we are very sure that things can definitely wait be careful in taking such decision by adding a deadline for that task in our schedule and should also make a note to remind our self about when we should start working on that.

Fig: 3.2.2.4 Prioritize

3.2.2.5: Organize

As you prioritize tasks and set deadlines, you will want to organize your plans and actions. Some time we are using paper and pencil to organize our plans, but it is important for you in today's environment to use planner as it includes calendar and enough space to make notes. Most of the planners are equipped with calendar space, space to note down daily activities, contact information, and "to do" lists. Look for the planner which satisfy your need and start using it. You will feel like it is an essential tool for you to manage your time.

We can also consider device like computer to help in organizing our time. The modern computers are equipped with necessary features such as calendars, task lists, reminder, and contact details using software programs. In case you do not have these features in your computer you get it installed very easily.

You may also consider a small personal digital assistant, or PDA. These devices are small enough to fit in your hand, and use the same software your home computer uses. When we do not have computer access PDAs plays important role specially during travelling to keep you updated with your pending task.

Fig: 3.2.2.5 Organize

3.2.2.6: Learn When To Say "NO"

The strategies we have mentioned so far have all concerned common business practices. Now, let's address some more "personal" strategies that you can apply to your life. These also have a great impact on how effectively you manage your time.

As strategies first thing you need to learn is to say "NO" when it is appropriate. Your life in an organization has always been about giving all that you can to serve your organization. We cannot change this but as our responsibility expands as a leader you will find that you asked to do too much comparatively your job position is required.

When we say no it does not mean that we are closing the door of our responsibility. It should be considered as we are very serious to meet our in-hand commitments and achieve it as far as possible within allotted time.

To be able to say "NO", you will have to accept these three principles:

• We should realize that we cannot do everything.

• We should not undertake the task or project that we are not sure to complete within the allotted time frame.

• We will not make commitments that are not consistent with the goals and objectives I have set for myself.

If you keep these principles in mind, you will find it easier to justify (and explain) why some requests must be turned down. You will also find that you are better able to accomplish the things that you have prioritized as "must do."

Fig: 3.2.2.6 Learn When To Say "NO"

3.2.2.7: Use Your Waiting Time

Another personal time management skill is to make good use of your "waiting time."

You need to think over everyday how much time you spend doing nothing?

Actually certain situation suddenly popup which is not planned and the time is allocated for something else. We can even make use of our time in these unplanned events. For instance:

- Time you spend commuting on a train or bus
- Time you wait at the doctor or dentist office for your appointment
- Time you spend on a plane, waiting for your plane, or the time you spend waiting for your baggage
- Time you spend "on hold" on the telephone
- Time you spend when you arrive at work or at a meeting earlier than you had anticipated

The trick to make use of your waiting time is to always make sure you have something with you that you can accomplish in the event that you are kept waiting.
For instance:

- **Reading Correspondence** – Always keep you email with yourself so that during travelling you can read your email. Now a day PDAs are equipped with e-mail capability.
- **Writing Letters or Memos** – While you wait, you can take out a notepad or use a PDA to write letters or memos. This could also be a good time to update your planner
- **Reading or Listening to Tapes** – Carry a book or magazine or a tape with you. You can also download books and articles to your PDA. There is often no time in your schedule to catch up with books or articles related to your business or for self-improvement. Instead of being impatient when you are delayed, this could be a perfect time to advance your knowledge and skills

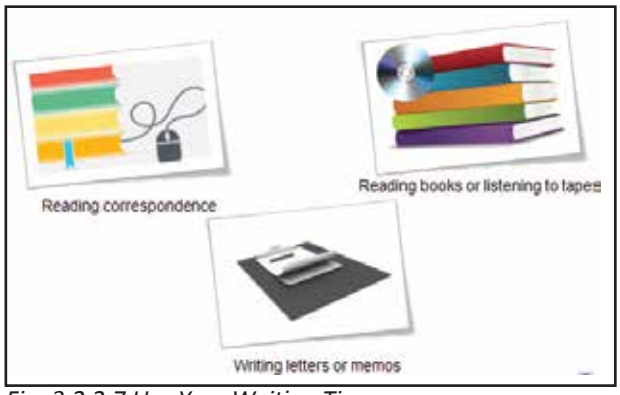

Fig: 3.2.2.7 Use Your Waiting Time

3.2.2.8: Focus On The Task

When you serve as a leader you are managing many activities and we cannot cut ourselves from this fact. There is no way around this fact. But, one important strategy to keep in mind is to concentrate completely on the current task. Concentration can be difficult when you have a lot on your mind. Your time will be better spent if you are able to:

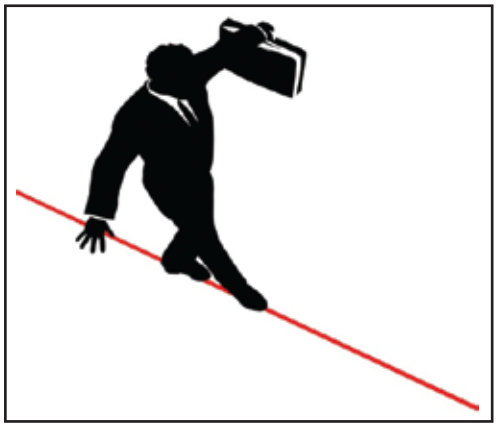

Fig: 3.2.2.8 Use Your Waiting Time

• **Focus on Your Goal –** Everybody has various set of commitments and concerns, but for better accomplishment focus on the task at a moment is very much required.

• **Avoid Interruptions –** When need to set our specific time in day time in which we should not talk on phone or attend visitor meeting because this is the time we can pay highest level of attention to our task. We cannot separate all of our time but definitely avoid interruption during specific period of time and this way we can successfully complete task in less time than it was expected. When you must respond to phone calls, be assertive in minimizing interruptions by asking if you can call back at another time or meet another day.

3.2.2.9: Manage Prime Time

Everyone is different. Most research shows that tasks that take the most mental concentration are most effectively accomplished early in the day, but even these studies acknowledge that this is not always true, and that everyone has a "personal prime time."

When you plan your tasks, think about your own "prime time." If you do your best work early, plan to do the routine tasks later in the day and concentrate on the more challenging tasks when you are at your best. If you don't really get going until later, handle the routines in the morning and save the more difficult tasks for later.

Fig: 3.2.2.9 Manage Prime Time

3.2.2.10: Celebrate Your Success

Achievement of goals needs to be celebrated so that a healthy balance in life between work and play can be maintained.
After completing a task or finish project you need to be rewarded by yourself.
If you are working as tem member or you might have delegated some tasks to other member, whole team should be rewarded. Celebration is a vital part of all project management. No matter how tight your schedule looks, this is

TIME WELL SPENT!

Fig: 3.2.2.10 Celebrate Your Success

3.2.2.11: Celebrate Your Success

Just consider a situation in which your boss is asking you to prepare an important presentation.
You are already occupied with your work load and many pending task in your to-do list which also very import-ant.
In this situation you will be anxious and confuse about which task to complete first.

Urgent/Important Principle is helpful in thinking about priorities and decides about important, essential and distraction types of activities.
Important activates whether these are personal or professional are outcome based which leads to us in achieving our goals.
Urgent activities insist us for our immediate attention but it is mainly linked with achieving goals for someone else. They are often the ones we focus on, and they demand attention because the results of not dealing with them are immediate.
When we know which activities are important and which are urgent, we can identify the activities that we should focus on, as well as the ones we should ignore.

To use the principle, list down all of your tasks and activities, and put each task/activity into one of the following categories:
1. Important and urgent
2. Important but not urgent
3. Not important but urgent
4. Not important and not urgent

Based on urgency of importance task and activity, we need to schedule these. Urgent and important task should be prioritized first then focus on important but not urgent tasks. Actually important but not urgent type of activities prevents us in our goal achievement. The best process in this situation is to decide about rescheduling or delegation. If the activity is not important and urgent it is better to avoid if possible.

3.2.3: Workplace Cleanliness

In the workplace, hygiene is very important. Through the introduction of some sensible office policies, you can help to make sure that your workplace is clean and hygienic as possible. Workplaces should be safe and clean with minimal exposure to germs. Regardless of the industry, these policies are very important, and may not be limited to hand washing, hand sanitizers, personal hygiene expectations and illness policies. Many workers find themselves overwhelmed by the amount of junk and clutter on their desks. By sparing a few minutes each day, the office surroundings can be professional, healthier and less stressful. While hiring a commercial cleaning service is very important for ensuring a healthy and clean workplace, it is also just as important to undertake some basic rules of cleanliness to help make sure the office is at its best.

3.2.3.1: 5S Approach

5S is short for: Sort, Set in Order, Shine, Standardize and Sustain

5S represents 5 disciplines for maintaining a visual workplace (visual controls and information systems).

These are foundational to Kaizen (continuous improvement) and a manufacturing strategy based “Lean Manufacturing” (waste removing) concepts.

5S is one of the activities that will help ensure our company’s survival.

3.2.3.2: Some New Concepts

These are:

- Red Tag Process for tagging, removing and disposing of items that are not needed in the work area.
- Lean Manufacturing concept that seek continuous improvement by removing waste in processes.

Some Japanese words you need to know:

- Kaizen (pronounced “kizen”) – Improvement
- Kaizen Event and 5S Event – Planned improvements to a specific area or process (usually take 3 to 5 days). 5S Events focus on making 5S improvements.
- Muda (pronounced “moo da”) – waste
- Gemba(pronounced “gimba”) – workplace
- Kanban (pronounced “kon bon”) – Pull type inventory control system. Items are only produced to meet customer’s needs. The request to produce more is signaled from an upstream operation and/or custom-er orders.
- Value Stream Map – A diagram of all processes needed to make and deliver the product to the custom\ er.

Other Problem Solving Tools

Theory of Constraints (TOC) is a problem solving and constraint management methods. Use the five Step form of TOC to solve problems that you will encounter in your continuous improvement efforts

3.2.3.3: 5S Examples

The obstructions we experience during work scenario are not impossible to tackle. Here the most important thing to identify and make sure these obstacle exist and effecting you in maintaining your time. When you have identified your obstacles, you can begin to overcome them.
Let's now learn about some strategies you can use to overcome the obstacles you just examined.

Fig: 3.2.3.3.1 Before 5S

Fig: 3.2.3.3.2 After 5S

You can see how the things are lying untidy before 5S and how after 5S the things are cleaned, organized and drawers are labeled. Overall, by using the 5S approach we can locate the stuff in less time and avoid the frustration in hunting things.

3.2.3.4: 5S Examples – Sort, Set in Order

Fig: 3.2.3.4.1 Sort

Sort – All unneeded tools, parts and supplies are removed from the area

Fig: 3.2.3.4.2 Set in Order

Set in Order – A place for everything and everything is in its place

3.2.3.5: Examples – Shine

Fig: 3.2.3.5 Shine

Shine –During the ongoing work area is getting cleaned and\or there a routine to be maintained to keep the work area clean.

3.2.3.6: 5S Examples – Standardize

Standardize – consistently apply identification and cleaning methods. Departments have weekly 5S tours. Every job has duties that use Sort, Set in Order and Shine

It is a common duty to all workers in the organization to maintain cleaning and hygiene of break-room, restrooms, locker area, parking lot, etc

3.2.3.7: 5S Examples – Sustain

Sustain involves a habit called 5S which needs to be improved continually.

Concept of 5S very simple but backed with very good results.

Additional information on 5S is required to equip you for better performance.

If concept of 5S is followed in a better way work environment become much better in terms of cleaning, safety, organized, reduced confusion and stress level.

Use the 5S at work, home and play area. The more you use it, the easier it becomes and life just gets better and better.

3.2.3.8: The Good, Bad and The Ugly

First the Bad and the Ugly – Life Without 5S

Fig: 3.2.3.8.1 The Bad and The Ugly

The Good

Fig: 3.2.3.8.2 The Good

3.2.3.9: What is Waste (Muda)?

Some of the main forms of waste are:

- Overproduction
- Waiting for materials, machines or instruction
- Transportation or movement
- Excessive inventory
- Inefficient machine processing and/or operation
- Producing defects
- Part or line changeover or machine setup
- Inadequate housekeeping
- Miscommunication or inadequate instruction

Fig: 3.2.3.9 What is Waste (Muda)?

3.2.3.10: What is Improvement (Kaizen) Principles?

Get rid of all old (false) assumptions. Don't look for excuses; look for ways to make it happen. Don't worry about being perfect. Even if you only get it half right "start NOW"! It does not cost money to do KAIZEN. If something is wrong, "Fix it NOW". When we get stuck in tough situation, our mind explores the get good ideas to resolve the issues. In such situation we need to ask ourselves much time about the cause of issues and get opinion from many people around you. Do not stop doing KAIZEN.

3.2.3.11: Good Housekeeping

It means the working area is neat and free from clutter. It reduces accidents. To ensure good housekeeping:

- Pick up anything you find lying on the floor
- Store all tools properly
- Spilled oil, water or any other liquid should be wiped up immediately
- Creepers, jacks and other such floor equipment should not be left scattered around
- Be careful about projection e.g. jack handles. See that they don't project from under the car

Notes

Exercise-1: Answer the Following Questions:

1. Write are the benefits of organization policies and procedure?

2. Write are the obstacles to effective time management?

3. Write is waste?

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4. Work Effectively as Team

Unit 4.1 – Performance Criteria for Working Effectively as Team

Unit 4.2 – Knowledge & Understanding: Working Effectively as Team

ASC/ N 0002

Key Learning Outcomes

At the end of this module, you will be able to:

1. Interact & communicate effectively with colleagues including member in the own group as well as other groups
2. Use all forms of verbal and non-verbal communication to communicate clearly and effectively with your colleagues, supervisors, customers and other stakeholders
3. Demonstrate communication skills
4. Judge your customers' body language and accordingly use an appropriate approach to deal with them
5. Apply the best practices for grooming to look presentable and make good impression on your customers
6. Use proper personal etiquettes at workplace
7. Acquire knowledge and understanding required for team working

UNIT 4.1: Performance Criteria for Working Effectively as Team

Unit Objectives

Understand the performance criteria for Working effectively as team:

Interact & communicate effectively with colleagues including member in the own group as well as other groups

4.1.1: Learn To

Writing Skills

- Maintain clear communication with colleagues (by all means including face-to-face, telephonic as well as written)
- Work with colleagues to integrate work
- Pass on information to colleagues in line with organizational requirements both through verbal as well as non-verbal means
- Work in ways that show respect for colleagues
- Carry out commitments made to colleagues
- Let colleagues know in good time if cannot carry out commitments, explaining the reasons
- Identify problems in working with colleagues and take the initiative to solve these problems
- Follow the organization's policies and procedures for working with colleagues

UNIT 4.2: Knowledge & Understanding - Working Effectively as Team

Unit objectives

At the end of this unit, you will be able to:

1. Use all forms of verbal and non-verbal communication to communicate clearly and effectively with your colleagues, supervisors, customers and other stakeholders
2. Discuss the importance of communication skills
3. Judge your customers' body language and accordingly use an appropriate approach to deal with them
4. Apply the best practices for grooming to look presentable and make good impression on your customers
5. Use proper personal etiquettes at workplace

4.2.1: Communication Skills

Why Communication Skills?

Formal education is not a guarantee for achieving success in your life. Without special qualifications also people can become successful in their respective fields.

Many famous personalities, such as our Prime Minister Narendra Modi, had basic educational qualification, yet they became famous because of their amazing communication skills. This emphasizes the importance of communication skills in achieving your goal to work effectively with:
- External parties such as customers, vendors, etc
- Internal stakeholders such your peers and supervisors

Fig: 4.2.1.1 Communication Skills Matter

Fig: 4.2.1.2 Why Communication Skills?

4.2.2: Technical Knowledge

Different types of information that colleagues might need and the importance of providing this information when it is required

- Importance of helping colleagues with problems, in order to meet quality and time standards as a team

4.2.2.1: What is Communication?

Process of exchanging information between two human entities using a medium is called communication. People exchange information by speaking, writing or using body signals or languages.

Fig: 4.2.2.1 What is Communication?

4.2.2.2: Process of Communication?

Communication process major elements are sender, message, receiver and feedback.

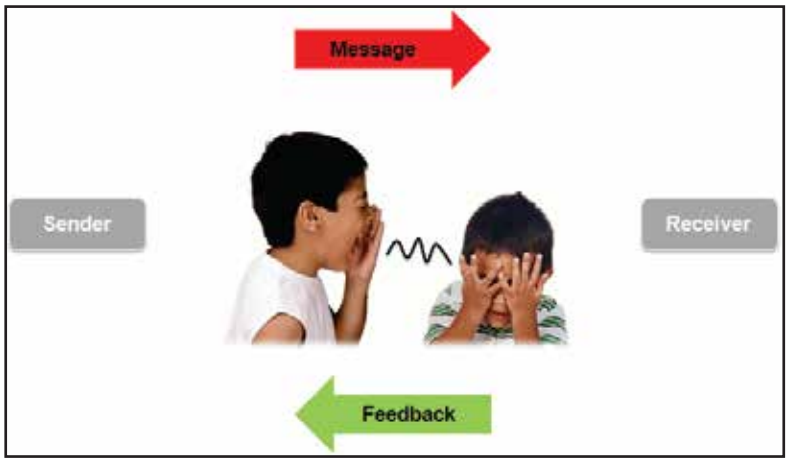

Fig: 4.2.2.2 Process of Communication

(1) Sender:

The person who shares information, ideas or solutions to other with a purpose is called sender or communicator.

(2) Message:
This is the ideas or information of the communication.

(3) Receiver:
When a person receives the message which is meant for him is called receiver. Job of receiver is not limited to receive the message only but also to understand it properly so that desired objectives can be achieved.

(4) Feedback:
The process of making sure that receiver has received the correct message and understood the sens of message by the sender.

4.2.2.3: Components of Effective Communication

Various researches have shown that an effective communication consists of:

- 93% Non-Verbal Communication or How You Say
  - 55% Body Language
  - 38% Voice
- 7% Verbal Communication or What You Say

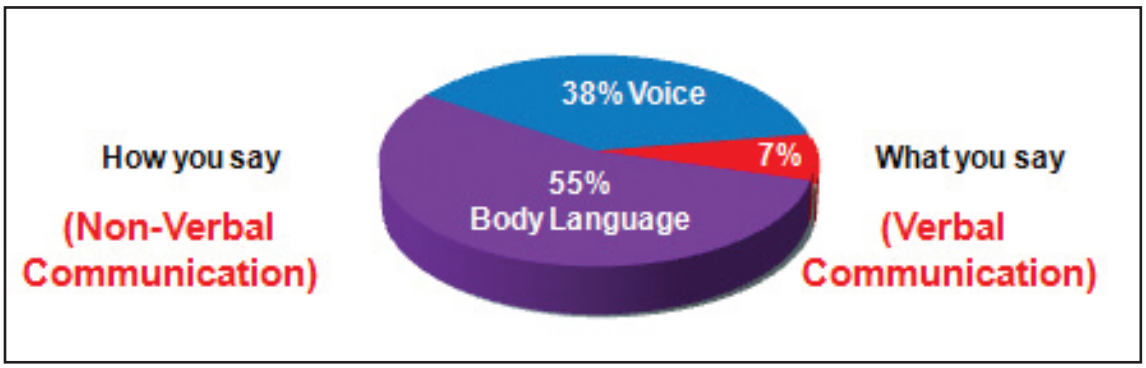

Fig: 4.2.2.3 Process of Communication

4.2.2.4: Verbal Communication

Importance of Verbal Communication :

Do you agree that whenever we start a conversation with someone, we are more focused towards what we say? But, words account for 7% importance in a conversation.
Our Dealership Executives are not that educated and hence have poor vocabulary.
Because of this our Dealership Executives feel inferior and lack confidence. But, they should understand that words account for only 7% in conversations and do not matter that much. Instead by improving their voice and body language, they can do a better job of communicating.

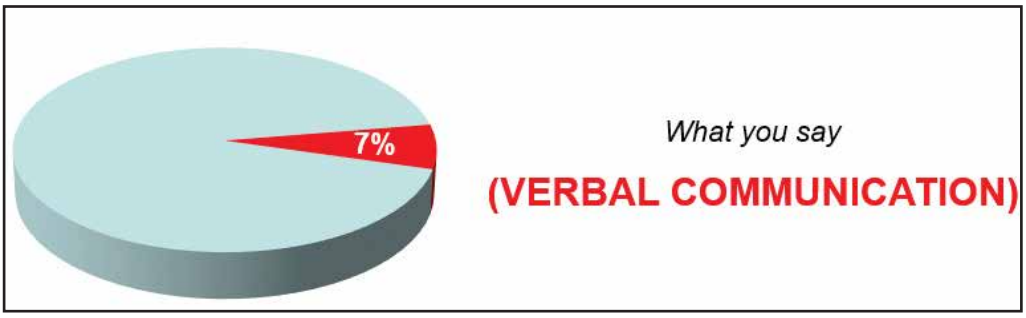

Fig: 4.2.2.4 Importance of Verbal Communication

Words :

Verbal communication consists of sharing thoughts through the meaning of words.
Words are a set of alphabets, to express our feelings or emotions. Verbal communications are of two types: written and oral communication.

4.2.2.5: How to Improve Verbal Communication

Some of the ways through which you can improve your verbal communication are:

- Read newspapers/magazines, etc.
- Practice using 10-15 new words everyday
- Avoid using slangs
- Think before you speak

While communicating always try to think about how someone else will understand what you are trying to communicate.

4.2.3: Non-verbal Communication

Components of Non-verbal Communication :

How you say (Non-verbal Communication) includes:

- Voice

- Body language

Fig: 4.2.3.1 Voice

Fig: 4.2.3.2 Body Language

4.2.3.1: Voice

Components of Non-verbal Communication:Voice :

Speech requires the presence of a voice that can be modulated. Vocal features that contribute to our interpretation of spoken language such as voiced pauses or intonation plays an important part to help us understand what is said to us. For instance, if the volume of your friend's speech is decidedly low, then there's a good chance he's sad over something. For example during a class teacher close the sentence with high pitch it means that she might be going to ask question.

What is Voice?

It is a specified quality, pitch and tone of vocal sound.

Relevance of Voice :

For an effective communication, voice has 38% importance. So, "The way you say" matters a lot.

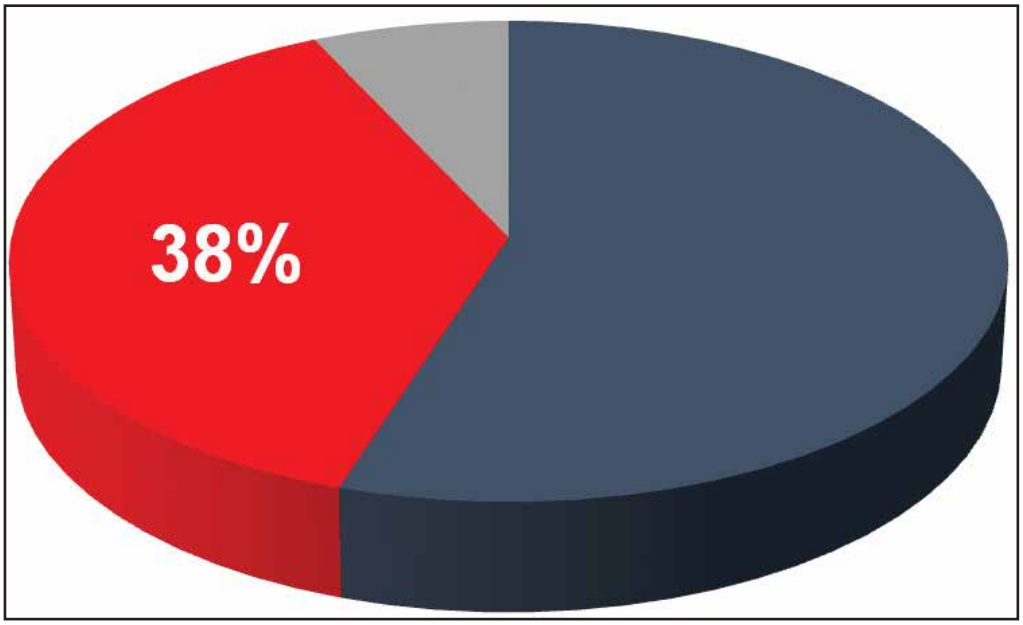

Fig: 4.2.3.1.1 Relevance of Voice

Characteristics of a Good Voice :

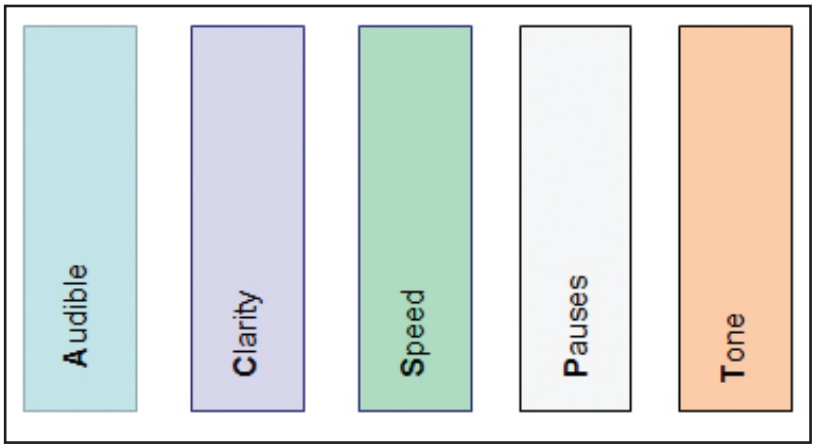

Fig: 4.2.3.1.2 Characteristics of a Good Voice

Keep the following principles in mind using voice for your communication:

- Audible: To be heard
- Clarity: To convey the right message
- Speed: To be understood
- Pauses: To gain attention before an important message
- Tone: To convey the information with as much vocal energy and enthusiasm as possible

4.2.3.2: Body Language

Components of Non-verbal Communication: Body Language :

Some time it is considered that speech is a small part of communication process. Most of the time it is considered that most of the information is conveyed by non verbal communication, voice tome, facial expression, eye contacts and other gestures, standing posture and so on. Body movement within communication process is basically representing to emphasize what we want to say and also to express our emotion and attitudes. While saying something some time body movement can also cause a conflict. If the person you are communicating with is a skilled observer can easily note you behavior to use as a clue of your feeling or thinking process.

Our human face is capable to reflect our expression and distortions. These reflection is getting interpreted depend on the situation we are communicating. For example we reflect shy expression on face when are asked any embarrassing question.

Let's explore the second component of the non-verbal communication–body language.

For an effective communication, Body Language has 55% importance.

Importance of Body Language :

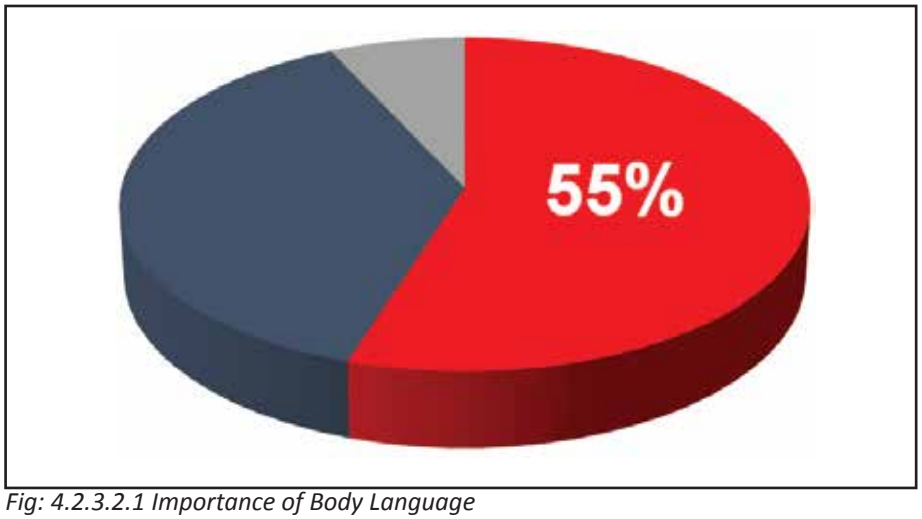

Fig: 4.2.3.2.1 Importance of Body Language

A lot of our communication happens without speaking through our body language, it is important that you adopt a proper body language in your communication.

Components of Body Language :

The key components of body language are:

- Body Posture
- Gestures
- Facial Expressions
- Eye Movements

Do's of Body Language :

Always follow these do's of body language in your communication:

Fig: 4.2.3.2.2 Shake Hands Firmly

Fig: 4.2.3.2.3 Smile

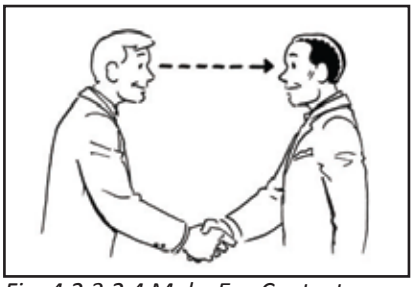

Fig: 4.2.3.2.4 Make Eye Contact

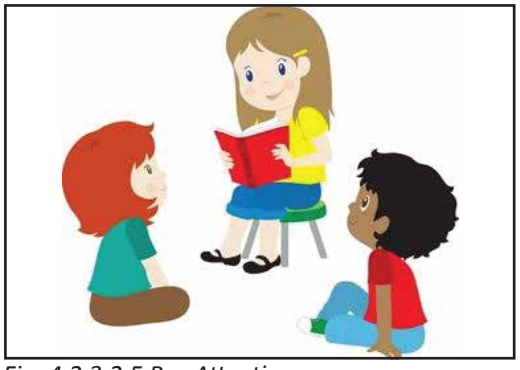

Fig: 4.2.3.2.5 Pay Attention

Fig: 4.2.3.2.6 Stand Straight

Don'ts of Body Language :

Avoid these don'ts of body language in your communication:

Fig: 4.2.3.2.7 Do Not Avoid the Customer's Gaze

Fig: 4.2.3.2.8 Do Not Hide Your Hands and Palms

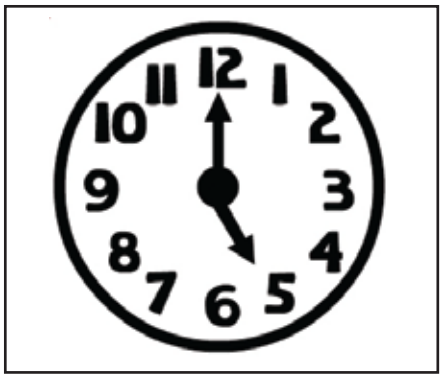

Fig: 4.2.3.2.9 Do Not Look at Your Watch

Fig: 4.2.3.2.10 Do Not Stare

Observe Your Customer's Body Language :

During your interactions with customers, you should understand their body language by observing:

- How they sit
- How they stand
- How they use their hands and legs
- What they do while talking to you

Customers touching their hair or yawning while interacting, for instance, can indicate boredom. By understanding the customer's feelings through their body language, you can change the manner in which you interact with them.

You can use mirroring technique to help the customer into his comfort zone. For example, if the customer's arms are crossed, you too should cross your arms to mimic the customer's action. You will then come across as friendly and helpful to your customers.

4.2.4: Listening Skill

Listening :

Active listening is one of the important skill of our communication process but many time as a communicator we spend our energy on what we wanted to say and not much focusing on what the other party wanted to say. Listening is basically the ability of a person to receive message properly and accurately interpret it in the communication process. Listening is considered as the key factor for successful communication process. If we do not give much important to listening messages can be easily misunderstood and can lead to communication break down because sender of the message may become frustrated.

Fig: 4.2.4.1 Listening

Let's now learn to use effectively each of these for successful interactions with others. Now let's explore listening skills further.

Overview :

Listening is basically the ability to accurately receive and interpret messages.

Over and average a person spend around 70% of their time in some type of communication. Out of this 70% communication time 45% spend in listening, 30% in speaking, 16% in reading and 9% in writing.

Fig: 4.2.4.2 Overview of Listening

Most of us do not listen, which leads to a communication gap. You should wait for your turn to speak rather than interrupt in between!

If you interrupt before your speakers have finished their sentences, then the focus has shifted to you from the speakers. Also, you are communicating to the speakers that your ideas are more important. Besides, it's rude to interrupt.

Tips for Listening :

Follow these tips to become an attentive listener:

- Focus on the speaker. Pay attention to what the speaker is saying. Look directly in the eye of your speaker.
- Take notes: This will help you stay alert.
- Reconfirm and ask questions: Always reconfirm your understanding by repeating the information that was shared with you. Ask questions to understand the message better. These tips will ensure that you heard what was said.
- Remove Distractions: Focus on the instruction received. We should avoid mobile phone use, shuffling paper, looking outside from window or other similar activities. IF you are performing these activity, listening process get disturbed and speaker will get a message that you are not taking interest.

Remember, if we were to talk more than we listen, we would have two tongues and one ear.

4.2.5: Writing Skill

Writing :

Writing forms an important form of communication. A better writing skill allows our messages to be communicated effectively with clarity. It is also having advantage to spread it to a larger audience comparatively face to face or telephonic discussion. Writing is considered as one of the ancient medium if communication by representing syntax and symmetric of language we are using and adding emotion using signage and symbols.

Overview :

The medium using which we communicate with the help of written to convey the message is called written communication.

You need to use written communications mainly for these activities:

Fig: 4.2.5 Overview of Writing

Do's and Don'ts of Written Communication :

Use the following do's and don'ts for written communication:

- Use simple language
- Highlight important words
- Use appropriate salutation and greeting
- Keep your sentences short and to the point
- Proof read the text before sharing

Here are the additional tips that you may consider for your written communication:

- Do write with the reader in mind. If you're writing about a technical subject for a non-technical reader, avoid using technical jargon and acronyms they may not know. If possible, explain concepts in a way that your reader can relate to.
- Be clear about what you are actually trying to communicate. Use short words and sentences to get across your point. It can be useful to use a list of bullet points rather than paragraph to make it easier to read and understand the information.
- Use salutation – Sir/Ma'am, Mr./Mrs./Ms., etc. – and Greeting – Good Morning, Hi, etc.
- Choose an appropriate font and size for your writing. Wingdings and Comic Sans are obviously out and anything less than 8-point will give your readers a headache.

4.2.6: Grooming

We represent our personality to the world with our outward appearance. We should not do our dressing only for other but for ourselves too. Our personality first impression is reflected to others by our external appearance thus external appearance become very important for us.

Overview :

Grooming is basically the state, condition, manner or style in which a person appears.

Good personal grooming can make you look good. Looking good usually improves your self-esteem and confidence.

Importance of Grooming :

Do you know 4 seconds are enough to make the first Impression! This means we need to act quickly in order to make a brilliant first impression on our customers.

Fig: 4.2.6.1 Importance of Grooming

Dressing :

Dressing is also an important part of personal grooming. Clothes should be clean and free of stains, holes, and wrinkles. Properly fitting clothes look best. Wearing clothing that is too big or small in size can make a person look untidy.

For lady sales executive, dress code would be Salwar kurta/Saree/T-Shirt with Jeans.

Let's now learn about tips for using correctly different parts of your dressing.

T-shirt

- Wear well-ironed T-shirt
- Make sure the collars are clean
- Tuck the shirt in the pant
- Wear normal fit, fit shouldn't be too loose or too tight

Trousers/Jeans

- Wear well-ironed trousers/jeans
- Make sure it's not low waist
- Avoid boot cut styles
- Avoid stuffing the pockets

Shoes

- Make sure they are neat and clean
- Ensure they are not too colourful
- Wear clean socks

- Ensure your shoes fit well, neither too tight or too loose

Belt

- Wear a Black color belt
- Ensure it's made of good leather
- Ensure it's not too long and not too short
- Avoid belts with flashy buckles

Watch

- Wear a good quality watch
- Ensure it's simple with straight or classy lines
- Make sure it's not flashy

Personal Hygiene :

Always follow these do's and dont's for maintaining personal hygiene:

Fig: 4.2.6.2 Take Shower Everyday

Fig: 4.2.6.3 Shave your facial hair regularly

Fig: 4.2.6.4 Shave your facial hair regularly

Fig: 4.2.6.5 Apply deodorant to prevent body odour

Fig: 4.2.6.6 Brush your teeth twice everyday

Fig: 4.2.6.7Rinse every time after eating

Maintaining Yourself :

You can look presentable at all times by following these tips:

Fig: 4.2.6.8 Take care of your skin

Fig: 4.2.6.9 Stand Upright

Fig: 4.2.6.10 Wear well fitted clothes

Fig: 4.2.6.11 Keep yourself updated

Fig: 4.2.6.12 Exercise regularly

4.2.7: Etiquette

How you present yourself to others in the business world speaks volumes. People many times get impressed by others within second of first meeting thus it became very crucial that you should prepare yourself well to present yourself as a professional.

Overview :

Office etiquette is very important as we does not show good manner it will reflect impact on business as employee morale and productivity may get hampered.

Etiquette is basically polite behaviour and courtesy, a person is expected to follow.

Tips for Personal Etiquette :

Follow these do's and don'ts for personal etiquettes at workplace:

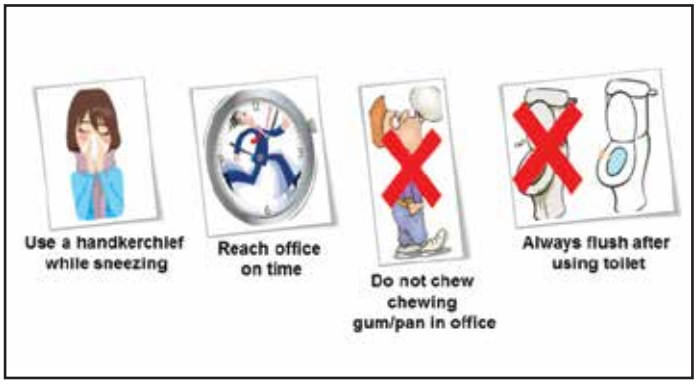

Fig: 4.2.7.1 Do's and Don'ts Personal Etiquettes

Follow these tips to practice proper professional etiquettes at workplace.

Fig: 4.2.7.2 Practice Proper Professional Etiquettes at workplace

Additionally,

- For meeting always reach on time.
- Keep meetings to the scheduled amount of time.
- During meeting focus on meeting and do not indulge yourself in emails, smart phone or computer.
- Do respect people's personal space while on the phone. A 'safe cell distance' is considered to be 10 feet.
- Don't hold meetings in your cubicle and distract those sitting nearby. For meetings with three or more people, go to a conference room or a break area.
- Avoid eating at your desk, have your lunch in the cafeteria or the place designated by organization.
- Maintain your voice volume while talking with someone even on telephone in cubical area.
- Respect your co-worker's property.
- Don't yell and scream at others.

4.2.8: Rapport Building

Overview :

By improving your overall communication skills, you can build rapport with people at your work. Rapport is basically "Getting along well with others".
Rapport building helps us:

- Establish feelings of Harmony, Goodwill and Trust
- Know more about the prospect's mood, attitude, style, needs, values and interests
- Get the prospect talking
- Promote open communication, develop trust and improve the probability of deal closure

Fig: 4.2.8 Overview of Rapport Building

Barriers to Rapport Building :

The key barriers to rapport building are:

- Lack of interest
- Lack of understanding
- Hesitation

To overcome these barriers and to build rapport, you need to understand the different types of customers, which brings us to our next topic "Customer Types".

4.2.9: Working in Team

Overview :

In this topic, you will get an overview of why team work is important, what are the important behaviours in effective teams and how you can help build up an effective team.

Fig: 4.2.9.1 Overview of Working in Team

Lessons from the Geese :

Teams are much more effective than individuals for work. Let's look at an example from Mother Nature to learn how an effective team works.

The geese actually fly in a group on their long flight of migration.

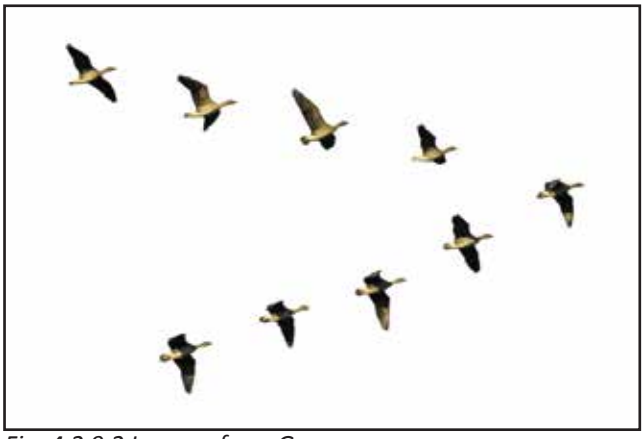

Fig: 4.2.9.2 Lessons from Geese

The flapping of the geese that are in front of the formation creates a draft for the geese at the rear reducing air resistance. This indicates their true sense of responsibility towards the fellow beings.

When the leader of the formation of the geese is tired, it goes back and another goose then comes in the front to lead the group of Geese. So, these Geese have no fixed leadership or hierarchy.

No goose likes to fly out of formation because it would get tired easily. Even if it does fly out of formation, it quickly comes back to its place. So, Geese have amazing team sense!

Geese also make a lot of noise while they fly. But it's interesting to note that the noise is not made by the geese leading the formation, but by the Geese in the back of the formation, which serve to support and keep everyone going. Isn't that the unique vocal support?

If one goose is ill and falls out of formation, a few of others stay with it, to be with it until it gets well or dies. Now, that's what we call team spirit!

Geese are unique as a team. The team behaves as a cohesive whole with a common goal of reaching a particular destination in mind. Team members help each other since they can collectively achieve much more than they can alone.

Fig: 4.2.9.3 Lessons from Geese

As explained about the Geese, being a human if we are sharing common set of direction and have consider our community can move fast and reach to our goal in shorter period because we move with trust on each other.

Considering the Geese if we follow their footsteps we will be connected with the persons who could lead us to reach our destination.

We willing accept help from others and offer our help to others.

It pays to take turns in doing the hard tasks and share the leadership. As with Geese, people are interdependent on each other's skills, capabilities and unique arrangements of gifts, talents and resources.

We need to make sure we are encouraging each other in the team. In teams where there is encouragement, the production is much higher.

Team Player Styles :

You need to be a good team player to work in a team.

Fig: 4.2.9.4 Team Player Styles

Contributors :

The first team player style is Contributors.

The following are the key characteristics of Contributors:

- Logical
- Efficient
- Organized
- Proficient
- Relevant
- Pragmatic
- Systematic
- Dependable
- Responsible

Contributors tend to be task-oriented. Their strengths lie in sharing information with the team and making sure every aspect of a work is taken care of. Contributors are thorough and detail-oriented.

Collaborators :

The second team player style is Collaborator.

The following are the key characteristics of Collaborators:

- Cooperative
- Flexible
- Confident
- Forward-looking
- Conceptual
- Accommodating
- Generous
- Open
- Visionary
- Imaginative

Collaborators are highly goal-oriented.

If you're the ones who make sure work stays on track, you're likely to be a Collaborator.

Communicator :

The third Team Player Style is Communicator.

Here are the key characteristics of Communicators:

- Tactful
- Helpful
- Friendly
- Patient

- Informal
- Relaxed
- Supportive
- Encouraging
- Considerate
- Spontaneous

The Communicator is a process-oriented member who is an effective listener.

If you focus on making sure the overall process goes smoothly, then you're likely to be a Communicator.

Challenger :

The fourth Team Player Style is Challenger.

The key characteristics of Challengers are:

- Candid
- Ethical
- Questioning
- Honest
- Truthful
- Outspoken
- Principled
- Adventurous
- Aboveboard
- Brave

The Challenger is a member who questions the goals, methods and even the ethics of the team. He is willing to disagree with the leader and encourages the team to take calculated risks.
If you're always looking at the bigger picture and questioning how and why things are done, then you may be a Challenger.

Commitment & Task Sharing Based on Individual's Skills :

A committed team treats the work like their own garden or pet – they obsess over it, they care for it, they own it. If a leader is trying to build a team who can give commitment to finish the assigned task, then it is important to align team member's personal visions to that of the organization.

4.2.10: Resolving Conflict

Conflict - It can be defined as a serious disagreement or argument. Conflict exist in almost all organization and some time it is also consider positive as it helps in healthy exchange of ideas and creativity. If the conflicts became counter conflict it may leads dissatisfaction to employee, productivity reduction and may also affect customer service.

Importance of Resolving Conflict:

You must avoid conflict at the work place as it brings negativity all around.

Fig: 4.2.10 Importance of Resolving Conflict

By deciding not to say something that would make you sound aggressive or frustrated, you can avoid unnecessary conflicts.

Conflicts take place when people are rigid and are not willing to cooperate with each other.

Let's look at some ways through which you can prevent and resolve conflicts.

Best Practices Resolving Conflict:

To resolve conflicts in a team, you should use these steps:

- Examine what is causing trouble
- Discuss the issue with the conflicting party
- Clarify expectations and roles
- Find an option which benefits all
- Utilize constructive feedback
- Reach agreements

You should always maintain a positive relationship while trying to reach an agreement.

Depersonalizing Conflicts:

You should always depersonalize conflicts by adopting these steps:

- Focus on issues not personalities
- Encourage both sides to be objective
- Evaluate concerns of both sides
- Encourage people to listen to other's view
- Encourage points of agreement
- Don't dwell on anger

When individuals find it difficult to adjust with each other, the best way is to sit together and discuss among themselves to reach the middle path. Instead of fighting with each other, it is better to discuss things and come to a solution which benefits all. For example, when the boss sets the timeline for completing a given task and the team member finds it unachievable, the team member should negotiate with his boss to slightly extend the timeline to make it practically achievable. Through discussion they can then reach the timeline that suits all.

Resolving Complaints:

Use the following do's to resolve complaints:

- Be warm to the others
- Show empathy
- Acknowledge the other's feelings
- Listen actively
- Isolate the core problem
- Provide a satisfactory resolution and an alternative
- Follow-up after the resolution

Avoid the following don'ts to resolve complaints.

Don't:

- Take a confrontational attitude
- Make assumptions
- Use technical or professional jargon
- Pass the blame
- Make unrealistic commitments
- Exceed your authority
- Sacrifice your company's interest

Responding to a Transactional Crisis:

Use the following do's to respond to a Transactional Crisis:

- Tell the whole story:
  - Openly
  - Completely
  - Honestly
- Apologize, if you are at fault
- Show your concern with:
  - Words
  - Actions

Avoid the following don'ts to respond to a Transactional Crisis.
Don't:

- Blame others
- Speculate in public
- Refuse to answer questions
- Release confidential information without permission
- Use the crisis to promote yourself

Giving Feedback:

Follow these best practices for giving feedback effectively:

- Hold the discussion in private
- Remain calm
- Show empathy
- Discuss the most important issues only
- Support your argument with facts, figures and observed behaviour
- Try to reach an agreement
- Summarise your understanding

4.2.11: Conduct at Workplace

Teamwork

Advantages of working in teams at a workplace

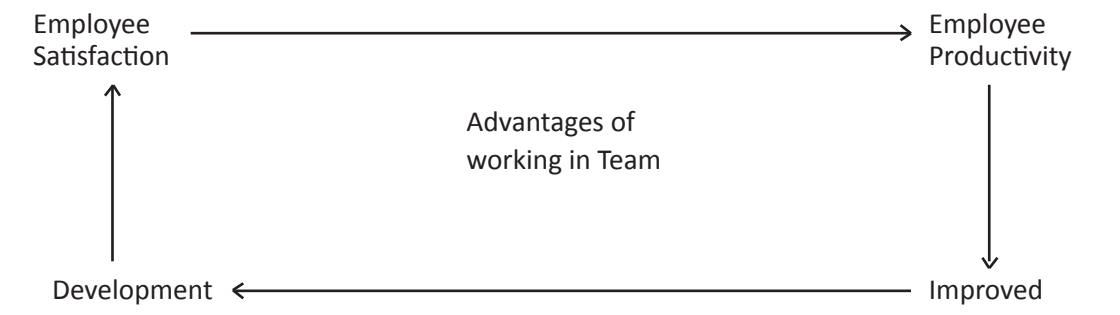

Chart: 4.2.11 Teamwork

Creativity:

- Improved Productivity – Successful teams develop the ability to accomplish more and faster.
- Improved Creativity – cross functionality application of different minds to the task usually produces original out of the box thinking.
- Focus – Properly tasked teams can solve intractable organizational problems.
- Development – serving on a team participating in team activity provides good development experience sometimes fast track for team members.
- Employee satisfaction – successful teams often have a good time members also have a sense of achievement.

Working in Teams:

- Managers: hold Conventional managerial responsibility and are drawn from the hierarchical culture of the organization.
- Facilitators: these are neutral, objective individuals who are chosen for their process consulting skills. They may also act as arbitrators in times of conflict between managers and team players.
- Team leader: These are often the department supervisors who must work with managers and facilitators and help them to shape the team.
- Team Players: these are the members of the team who share a common goal or purpose. they must be trained and developed to assume the special skills and responsibilities of self-management.
- Support Groups: these are clusters of individual who work with the team supporting them with specific required- e.g. the human resource, finance and administration departments.

Notes

Exercise-1: Answer the Following Questions:

1. Write are process of communication?

2. How to improve verbal communication?

3. What are the components of non-verbal communication?

4. What are the best practices to resolve conflict?

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5. Maintain a Healthy, Safe and Secure Working Environment

Unit 5.1 – Performance Criteria for Healthy, Safe & Secure Work Environment

Unit 5.2 – Knowledge & Understanding: Healthy, Safe & Secure Work Environment

ASC/ N 0003

Key Learning Outcomes

At the end of this module, you will be able to:

1. Perform as per the Performance criteria with respect to the resources needed to maintain a safe, secure working environment
2. Maintain of safe & secure workplace
3. Assess your responsibilities for workplace safety
4. Use best practices to remove potential hazards from your workplace and prevent accidents
5. Apply appropriate strategies to deal with emergencies at workplace

UNIT 5.1: Performance Criteria for Healthy, Safe & Secure Work Environment

Unit Objectives

Understand the performance criteria for working effectively as team:

Perform as per the need of resources to maintain a safe, secure working environment

Performance Criterion:

Resources needed to maintain a safe, secure working environment Study and Learn to:

- Comply with organization's current health, safety and security policies and procedures
- Report any identified breaches in health, safety, and security policies and procedures to the designated person
- Coordinate with other resources at the workplace to achieve the healthy, safe and secure environment for all, incorporating all government norms esp. for emergency situations like fires, earthquakes etc.
- Identify and correct any hazards like illness, accidents, fires or any other natural calamity safely and within the limits of individual's authority
- Report any hazards outside the individual's authority to the relevant person in line with organizational procedures and warn other people who may be affected
- Follow organization's emergency procedures for accidents, fires or any other natural calamity. Identify and recommend opportunities for improving health, safety, and security to the designated person
- Complete all health and safety records are updates and procedures well defined

UNIT 5.2: Knowledge & Understanding - Healthy, Safe & Secure Work Environment

Unit Objectives

At the end of this unit, you will be able to:

1. Maintain safe & secure workplace
2. Assess your responsibilities for workplace safety
3. Use best practices to remove potential hazards from your workplace and prevent accidents
4. Apply appropriate strategies to deal with emergencies at workplace

5.2.1: Importance of Safe & Secure Working Place

When we feel safe and secure, we can remain motivated and feel happy at our workplace. Workplace safety play an important role in organization as it boosts the productivity. If the workers in the organization feel safe they can work with their full capabilities and potential and it also reflect positivism in the working environment.

Therefore, measures needs to be taken to eliminate risks at work and ensure a safe and comfortable environment for the employees.

5.2.1.1: Employer's Responsibilities

The responsibilities of the employers for maintaining safe workplace are:

- Healthy workplace should be provided
- Train the worker as per their job profile
- Maintain training records (who, what and when)
- Establish and maintain a comprehensive occupational health and safety program, including a written health & safety policy and an incident investigation procedure
- Support supervisors, safety co-ordinators and workers in their health and safety activities
- During potential hazard reporting action should be taken immediately
- During incident instant investigation should be initiated
- Provide adequate first aid facilities and services
- Ensure supply of personal protective equipment as per nature of job

Worker training is usually carried out by the supervisor. However, the employer has the legal responsibility to ensure that every worker receives adequate training. The employer must follow up to see that the supervisor is carrying out all the required training. Employers should also work with supervisors to help foster positive worker attitudes to safety.

5.2.1.2: Supervisor's Responsibilities

The responsibilities of the supervisors for maintaining safe workplace are:

- Instruct workers in safe work procedures
- Provide training to worker based on their assigned task and ensure safe working of the same
- Make sure worker operating tools, equipment or any hazardous material have adequate training in handling the same
- Ensure material handling, storage are maintained as per defined procedure
- Enforce health and safety requirements
- Correct unsafe acts and conditions
- Identify workers with problems that could affect safety at the worksite
- Develop health and safety rules and inspect the workplace for hazards

5.2.1.3: Worker's Responsibilities

The responsibilities of the workers for maintaining safe workplace are:

- Know and follow health and safety requirements affecting your job
- If you don't know how to do something safely, ask for training before you begin work
- Work safely, and encourage your co-workers to do the same
- If unsafe condition is observed try to correct it and inform supervisor
- In case of any injury should be immediately reported to first aid attendant and supervisor
- Take the initiative. Make suggestions to improve health and safety

Fig: 5.2.1.3 Worker's Responsibilities

5.2.2: Workplace Hazards

The situation which can create threat to human life, property of workplace or environment is defined as hazard. Most of the hazards are hidden in nature which reflects theoretical risk but the fact is that if it becomes active it may lead to emergency. Situation of hazard when finish it turns to be in incident. Hazard and its possibility of getting activated act together to form a risk.

5.2.2.1: Modes of Hazard

Hazards are sometimes classified into three modes:

- **Dormant**: The circumstance project a possibility of active hazard but it does not affect people, property or environment. For instance, a hillside may be unstable, with the potential for a landslide, but there is nothing below or on the hillside that could be affected.
- **Armed:** People, property or environment is in potential harm's way.
- **Active:** A dangerous occurrence in which hazard has played its role. It is sometimes referred as accident, emergency, incident or disaster not hazard.

5.2.2.2: Types of Hazard

The common types of hazard are:

- A situation which cause physical harm to body or create extreme stress is referred as physical hazard. A physical hazard may be natural or human made also.
- Chemical hazards are substances which can create harm to human health, harm body parts, property or environment. Chemical hazard may be natural or human made also.
- Biological hazards – In this type of hazard biological agents plays a crucial role can cause harm to human health or body parts. These biological agents can be fungus, bacteria, viruses, parasites and foreign toxins.
- Psychological hazards usually taken place due to stressful working environment. Here potentially a person could be a hazard when affected psychological disturbance through stress or shift patterns and when a person is under the influence of alcohol, illness and lack of training.
- Electrical hazards are dangerous condition where a worker can or does make electrical contact with equipment or a conductor. From that contact, the person may sustain an injury from shock, and there is a potential for the worker to receive burn or blast injury.

5.2.2.3: Reporting of any Hazard Incidents

Follow your organization structure to report any hazards/incident to the relevant person.
Structure could be different from organization to organization.
Warn/inform your co-workers about any hazardous incidents for extra safety measurements.

5.2.3: Organization's Emergency Procedures

Every workplace should have a plan for dealing with emergencies. You should be instructed in that plan within your first few days on the job and have refresher training from time to time.

5.2.3.1: Questions to be asked for Emergency Procedures

Once you have been trained, you should be able to answer these questions:

- Where the emergency phone numbers are posted?
- Where are the fire extinguishers and how and when should they be used?
- What other specialized equipment may be needed in an emergency, and how it is used?
- Where are the fire alarms and fire exits?
- What is the evacuation plan for the building?
- What should you do during an earthquake?
- In case of evacuation, where outside the building is the assembly point and who should you report to?

5.2.3.2: Emergency Preparedness

It is the discipline of dealing with and avoiding both natural and manmade disasters.

5.2.3.3: Emergency Service Number

Dial the service number of these departments in case of emergency:

- Fire Brigade Department
- Police Department
- Ambulance Department
- Women Safety Department
- Security Department
- Pest Control Department

Fig: 5.2.3.3 Emergency Service Number

5.2.3.4: Medical Emergency Procedures

You should follow these steps for medical emergency procedures:

- An emergency medical service should be available near to your dealership
- At least one person should be trained enough to handle any medical emergency
- First-aid supplies should be available at the dealership
- Check – Call – Care route should be followed

5.2.3.5: Fire Preparedness Procedures

You should follow these emergency instructions in case of fire:

- Activate the ALARM.
- Evacuate the area.
- Call the fire department.
- Fight the fire only if:

  You know how.
  - The fire is small.
  - You are confined to the area where it started.
  - You have a way out.
  - You can work with your back to the exit.
  - You have the right type of extinguisher.
  - You feel confident that you can operate it effectively.
  - You are confident in operating it effectively.
  - **DO NOT fight the fire if:**
  - You have any not very sure and have any doubts.
  - It is spreading very fast and crossed the starting area.
  - Escape route is blocked.

Fig: 5.2.3.5 Emergency Service Number

EVACUATE THE BUILDING IMMEDIATELY

Confine a fire to the zone of origin, for a specified time, thereby preventing fire spread and leaving more time for safe evacuation of the building occupants.

If a fire breaks out, smoke containment systems prevent the movement of smoke and heat from one area to another.

5.2.3.6: Fire Prevention

Follow these steps for fire prevention:

- Don't unnecessarily accumulate trash and litter
- Keep the workplace areas neat and clean
- Keep yourself updated about location of fire alarm boxes and extinguishers
- Make sure you have knowledge about various types of fire extinguishers and confident to use them
- Store hazardous materials in designated areas
- Keep exits free of obstructions
- Know location of emergency exits and procedures
- Handle flammable liquids with caution

5.2.3.7: Fire Extinguishers

According to the type of fuel like paper, oil, grease etc. involve in the fire, it is classified as type A, B, C or D. Depending on the extinguishing agent inside a fire extinguisher like water, chemicals etc. it can be effective on one or more types of fire.

Some extinguisher are designed specifically to work on one class of fire where as some can work on two or sometimes three types of fire but none of the extinguisher works on all class of fire.

Class of Fire: A

Fuel Sources - Ordinary combustibles (e.g., trash, wood, paper, cloth)

Type of Extinguisher (Extinguishing Agent) - Water; chemical foam; dry chemical[1]

Fig: 5.2.3.7.1 Class of Fire A

Class of Fire: B

Fuel Sources - Flammable liquids (e.g., oils, grease, tar, gasoline, paints, thinners)

Type of Extinguisher (Extinguishing Agent) - Carbon dioxide (CO_2); halon[2]; dry chemical; aqueous film forming foam (AFFF)

Fig: 5.2.3.7.2 Class of Fire B

Class of Fire: C

Fuel Sources - Electricity (e.g., live electrical equipment)

Type of Extinguisher (Extinguishing Agent) - CO_2; halon; dry chemical foam (AFFF)

Fig: 5.2.3.7.3 Class of Fire C

Class Of Fire: ABC

They use mono-ammonium phosphate which is a dry chemical that is able to quickly put out the fire. It is a pale yellow powder that is able to put out all three classes of fire; Class A for trash, wood and paper, Class B for liquids and gases, and Class C for energized electrical sources.

Fig: 5.2.3.7.4 Class of Fire ABC

Specific Types of Fire Extinguishers and their Uses:

Fire Extinguishers	Uses
Water	• Pressurized, pump type • Cools fire • Use on Class A fires • Do not use on B or C fires
Multi Purpose Dry Chemical	• Stored pressure type • Smothers fire with layer of powder • Use on Class A, B and C fires
Chemical Foam	• Aqueous film forming foam (AFFF) type • Smothers fire with foam • Use on Class A and B fires
Compressed Gas	• Halon, CO_2 types • Smothers fire with gas • Use on Class B and C fires

Tab: 5.2.3.7.1 Engine Terminology

Colour Codification of Fire Extinguishers

Type	Old Code	BS EN 3 Colour Code	Fire Class
Water	Signal Red	Signal Red	A
Water Mist	White and Red	White and Red	A (B, C, electrical if dielectrically tested)
Foam	Cream	Red with a cream panel above the operating instructions	A B
Dry Powder	French Blue	Red with a blue panel above the operating instructions	A, B, C
Carbon Dioxide		Red with a black panel above the operating instructions	
Halon		No longer produced – illegal in the UK	A
Wet Chemical	Not in use	Red with a yellow panel above the operating instructions	A

Tab: 5.2.3.7.2 Engine Terminology

5.2.3.8: Evacuation Procedures in Emergency

Let's now learn about the for evacuation procedures for workers & visitors in case of emergency

As the first step a layout must be made of the building, including:

- Evacuation Routes
- Fire Extinguisher (locations)
- Fire Alarm Stations (locations)
- First Aid Kit (locations)

The second step for evacuation procedures for workers & visitors in case of emergency includes creating a map of the parking lot and surrounding buildings.
This must show the Rally Point. Rally Point must be a safe distance from the building. It must be easily accessible, out of the way of emergency services, and should not be beside the fire hydrant.
Both the layout and the Rally Point must be posted conspicuously throughout the facility and made available to all employees upon request.

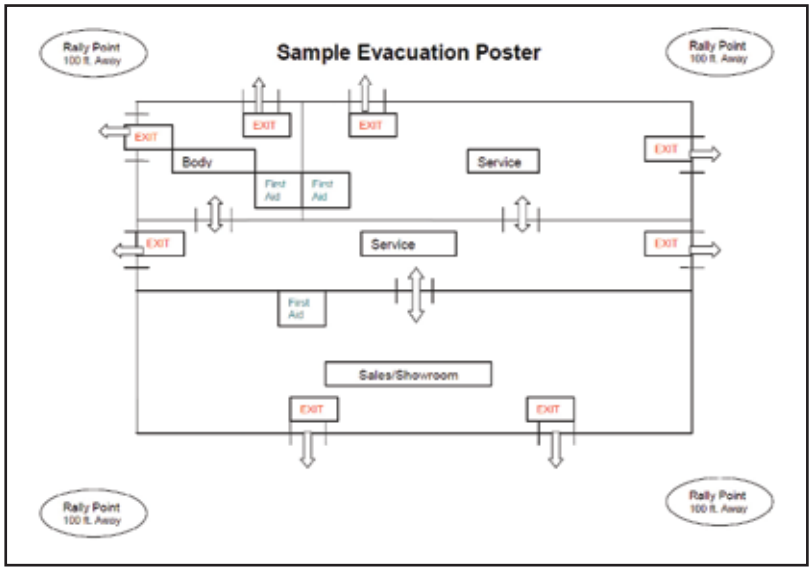

Fig: 5.2.3.8 Evacuation Procedures for Workers & Visitors

5.2.3.8.1: Roles of First Responder

First responder can be defined as an employee working for emergency service who is responsible to:
Assist in case of any issues and should reach to the spot immediately after getting the information.
Should be fully aware about burns first aid procedure for burns is, and should be able to use the same, immediately, at the site of the fire accident to the injured people.

They should try to put out the fire using fire extinguisher or other means.
They should rescue the victim from the burning premises.
They should have knowledge on different types of fires like chemical, electrical etc., and should take the appropriate measures to contain and put out these fires.

5.2.3.9: Auto Shop Safety

- Personal Safety: Observe the following general safety precautions while working in automotive workshop
- Don’t indulge in horseplay
- Don't scatter the tools etc. on the operating machinery
- Don't keep sharp objects or tools in your pocket
- See that your dress is suited to the job. It should not be loose which may get caught in the moving machinery
- Never use compressed air for blowing out dirt from Tour clothes
- While chipping, grinding or using air hose or doing any other job where there is danger of flying particles, goggles must be worn

Fig: 5.2.3.9 Wear Safety Glasses While using a Grinder

5.2.3.10: Safety with Hand Tools

- Use the correct tool for the job in hand
- Use the tool correctly
- Keep the tools clean and in good working condition
- Grease or oil on tools should be wiped off as it is difficult to hold and use such tools
- Store the tools in their proper places

5.2.3.11: Safety with Power Tools

There are three main dangers with the use of power tools:

- Electric shock: The safety precautions are —
  - Don't use damaged chords
  - Don't stand in water or even wear wet shoes when working with electrical equipment
  - Make sure the electrical equipment is properly earthed

- Flying metal chips the safety precautions is — ALWAYS WEAR GOGGLES
- Injuries due to unsafe use of tools: The safety precautions are:
  - Carefully study the instructions before using any equipment
  - Keep hands and clothes away from moving parts
  - Make sure the electrical equipment is properly earthed
  - When working on devices like clutches, valves etc. which have springs, make sure the springs will not slip or jump off
  - Don't adjust or oil moving part of a machine

5.2.3.12: Safety Equipment

When working on vehicles, think safety first. You should use the proper tools and clothing to protect yourself

Eye Protection:

It is mandatory requirement to use eye protection while working on car in workshop because eyes are very sensitive. To prevent foreign material entering into eyes always use safety glasses or goggles. While inspecting under-body of vehicle it became extremely important to use eye protection. Even if you are using vision correction glass still you need to use goggles on top of it.

Ear Protection:

While working in excessively loud environment we must use earplugs or earmuffs. If the noise level is very high it may damage our hearing capability.

Gloves:

While working on tyre or the area of vehicle which is typically hot it become necessary to use gloves. Tyres steel belts if poked out from the thread can cause hand injury even heated areas like exhaust can also cause such injury. While working on chemicals, oils and grease use disposable latex gloves.

Notes

Exercise-1: Answer the Following Questions:

1. Write are responsibilities of the workers for maintaining safe workplace?

_____
_____
_____
_____

2. Write are the types of hazard at workplace?

_____
_____
_____
_____

3. Write are the questions to be asked for emergency procedure?

_____
_____
_____
_____

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6. Employability & Entrepreneurship Skills

Key Learning Outcomes

At the end of this unit, you will be able to:

1. Explain the meaning of health
2. List common health issues
3. Discuss tips to prevent common health issues
4. Explain the meaning of hygiene
5. Understand the purpose of Swacch Bharat Abhiyan
6. Explain the meaning of habit
7. Discuss ways to set up a safe work environment
8. Discuss critical safety habits to be followed by employees
9. Explain the importance of self-analysis
10. Understand motivation with the help of Maslow's Hierarchy of Needs
11. Discuss the meaning of achievement motivation
12. List the characteristics of entrepreneurs with achievement motivation
13. List the different factors that motivate you
14. Discuss how to maintain a positive attitude
15. Discuss the role of attitude in self-analysis
16. List your strengths and weaknesses
17. Discuss the qualities of honest people
18. Describe the importance of honesty in entrepreneurs
19. Discuss the elements of a strong work ethic
20. Discuss how to foster a good work ethic
21. List the characteristics of highly creative people
22. List the characteristics of highly innovative people
23. Discuss the benefits of time management
24. List the traits of effective time managers
25. Describe effective time management technique
26. Discuss the importance of anger management
27. Describe anger management strategies
28. Discuss tips for anger management
29. Discuss the causes of stress
30. Discuss the symptoms of stress
31. Discuss tips for stress management
32. Identify the basic parts of a computer
33. Identify the basic parts of a keyboard
34. Recall basic computer terminology
35. Recall basic computer terminology

36. Recall the functions of basic computer keys
37. Discuss the main applications of MS Office
38. Discuss the benefits of Microsoft Outlook
39. Discuss the different types of e-commerce
40. List the benefits of e-commerce for retailers and customers
41. Discuss how the Digital India campaign will help boost e-commerce in India
42. Explain how you will sell a product or service on an e-commerce platform
43. Discuss the importance of saving money
44. Discuss the benefits of saving money
45. Discuss the main types of bank accounts
46. Describe the process of opening a bank account
47. Differentiate between fixed and variable costs
48. Describe the main types of investment options
49. Describe the different types of insurance products
50. Describe the different types of taxes
51. Discuss the uses of online banking
52. Discuss the main types of electronic funds transfers
53. Discuss the steps to prepare for an interview
54. Discuss the steps to create an effective Resume
55. Discuss the most frequently asked interview questions
56. Discuss how to answer the most frequently asked interview questions
57. Discuss basic workplace terminology
58. Discuss the concept of entrepreneurship
59. Discuss the importance of entrepreneurship
60. Describe the characteristics of an entrepreneur
61. Describe the different types of enterprises
62. List the qualities of an effective leader
63. Discuss the benefits of effective leadership
64. List the traits of an effective team
65. Discuss the importance of listening effectively
66. Discuss how to listen effectively
67. Discuss the importance of speaking effectively
68. Discuss how to speak effectively
69. Discuss how to solve problems
70. List important problem solving traits

71. Discuss ways to assess problem solving skills
72. Discuss the importance of negotiation
73. Discuss how to negotiate
74. Discuss how to identify new business opportunities
75. Discuss how to identify business opportunities within your business
76. Understand the meaning of entrepreneur
77. Describe the different types of entrepreneurs
78. List the characteristics of entrepreneurs
79. Recall entrepreneur success stories
80. Discuss the entrepreneurial process
81. Describe the entrepreneurship ecosystem
82. Discuss the government's role in the entrepreneurship ecosystem
83. Discuss the current entrepreneurship ecosystem in India
84. Understand the purpose of the Make in India campaign
85. Discuss the relationship between entrepreneurship and risk appetite
86. Discuss the relationship between entrepreneurship and resilience
87. Describe the characteristics of a resilient entrepreneur
88. Discuss how to deal with failure
89. Discuss how market research is carried out
90. Describe the 4 Ps of marketing
91. Discuss the importance of idea generation
92. Recall basic business terminology
93. Discuss the need for CRM
94. Discuss the benefits of CRM
95. Discuss the need for networking
96. Discuss the benefits of networking
97. Understand the importance of setting goals
98. Differentiate between short-term, medium-term and long-term goals
99. Discuss how to write a business plan
100. Explain the financial planning process
101. Discuss ways to manage your risk
102. Describe the procedure and formalities for applying for bank finance
103. Discuss how to manage your own enterprise
104. List important questions that every entrepreneur should ask before starting an enterprise

UNIT 6.1: Personal Strengths & Value Systems

Unit Objectives

At the end of this unit, you will be able to:

1. Explain the meaning of health
2. List common health issues
3. Discuss tips to prevent common health issues
4. Explain the meaning of hygiene
5. Understand the purpose of Swacch Bharat Abhiyan
6. Explain the meaning of habit
7. Discuss ways to set up a safe work environment
8. Discuss critical safety habits to be followed by employees
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25. Describe effective time management technique
26. Discuss the importance of anger management
27. Describe anger management strategies
28. Discuss tips for anger management
29. Discuss the causes of stress
30. Discuss the symptoms of stress
31. Discuss tips for stress management

6.1.1 Health, Habits, Hygiene: What is Health

As per the World Health Organization (WHO), health is a "State of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." This means being healthy does not simply mean not being unhealthy – it also means you need to be at peace emotionally, and feel fit physically. For example, you cannot say you are healthy simply because you do not have any physical ailments like a cold or cough. You also need to think about whether you are feeling calm, relaxed and happy.

Common Health Issues

Some common health issues are:

- Allergies
- Asthma
- Skin Disorders
- Depression and Anxiety
- Diabetes
- Cough, Cold, Sore Throat
- Difficulty Sleeping
- Obesity

Tips to Prevent Health Issues

Taking measures to prevent ill health is always better than curing a disease or sickness. You can stay healthy by:

- Eating healthy foods like fruits, vegetables and nuts
- Cutting back on unhealthy and sugary foods
- Drinking enough water everyday
- Not smoking or drinking alcohol
- Exercising for at least 30 minutes a day, 4-5 times a week
- Taking vaccinations when required
- Practicing yoga exercises and meditation

How many of these health standards do you follow? Tick the ones that apply to you.

1. Get minimum 7-8 hours of sleep every night. ☐
2. Avoid checking email first thing in the morning and right before you go to bed at night. ☐
3. Don't skip meals – eat regular meals at correct meal times. ☐
4. Read a little bit every single day. ☐
5. Eat more home cooked food than junk food. ☐

6. Stand more than you sit. ☐
7. Drink a glass of water first thing in the morning and have at least 8 glasses of water through the day. ☐
8. Go to the doctor and dentist for regular checkups. ☐
9. Exercise for 30 minutes at least 5 days a week. ☐
10. Avoid consuming lots of aerated beverages. ☐

What is Hygiene?

As per the World Health Organization (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases." In other words, hygiene means ensuring that you do whatever is required to keep your surroundings clean, so that you reduce the chances of spreading germs and diseases.

For instance, think about the kitchen in your home. Good hygiene means ensuring that the kitchen is always spick and span, the food is put away, dishes are washed and dustbins are not overflowing with garbage. Doing all this will reduce the chances of attracting pests like rats or cockroaches, and prevent the growth of fungus and other bacteria, which could spread disease.

How many of these health standards do you follow? Tick the ones that apply to you.

1. Have a bath or shower every day with soap – and wash your hair with shampoo 2-3 times a week. ☐
2. Wear a fresh pair of clean undergarments every day. ☐
3. Brush your teeth in the morning and before going to bed. ☐
4. Cut your fingernails and toenails regularly. ☐
5. Wash your hands with soap after going to the toilet. ☐
6. Use an anti-perspirant deodorant on your underarms if you sweat a lot. ☐
7. Wash your hands with soap before cooking or eating. ☐
8. Stay home when you are sick, so other people don't catch what you have. ☐
9. Wash dirty clothes with laundry soap before wearing them again. ☐
10. Cover your nose with a tissue/your hand when coughing or sneezing. ☐

See how healthy and hygienic you are, by giving yourself 1 point for every ticked statement!

Then take a look at what your score means.

Your Score

0-7/20: You need to work a lot harder to stay fit and fine! Make it a point to practice good habits daily and see how much better you feel!

7-14/20: Not bad, but there is scope for improvement! Try and add a few more good habits to your daily routine.

14-20/20: Great job! Keep up the good work! Your body and mind thank you!

Swachh Bharat Abhiyan

We have already discussed the importance of following good hygiene and health practices for ourselves. But, it is not enough for us to be healthy and hygienic. We must also extend this standard to our homes, our immediate surroundings and to our country as a whole.

The 'Swachh Bharat Abhiyan' (Clean India Mission) launched by Prime Minister Shri Narendra Modi on 2nd October 2014, believes in doing exactly this. The aim of this mission is to clean the streets and roads of India and raise the overall level of cleanliness. Currently this mission covers 4,041 cities and towns across the country. Millions of our people have taken the pledge for a clean India. You should take the pledge too, and do everything possible to keep our country clean!

What are Habits?

A habit is a behaviour that is repeated frequently. All of us have good habits and bad habits. Keep in mind the phrase by John Dryden: "We first make our habits, and then our habits make us." This is why it is so important that you make good habits a way of life, and consciously avoid practicing bad habits.

Some good habits that you should make part of your daily routine are:

- Always having a positive attitude
- Making exercise a part of your daily routine
- Reading motivational and inspirational stories
- Smiling! Make it a habit to smile as often as possible
- Making time for family and friends
- Going to bed early and waking up early

Some bad habits that you should quit immediately are:

- Skipping breakfast
- Snacking frequently even when you are not hungry
- Eating too much fattening and sugary food
- Smoking, drinking alcohol and doing drugs
- Spending more money than you can afford
- Worrying about unimportant issues
- Staying up late and waking up late

Tips

- Following healthy and hygienic practices every day will make you feel good mentally and physically.
- Hygiene is two-thirds of health – so good hygiene will help you stay strong and healthy!

6.1.2: Safety: Tips to Design a Safe Workplace

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Use ergonomically designed furniture and equipment to avoid stooping and twisting
- Provide mechanical aids to avoid lifting or carrying heavy objects
- Have protective equipment on hand for hazardous jobs
- Designate emergency exits and ensure they are easily accessible
- Set down health codes and ensure they are implemented
- Follow the practice of regular safety inspections in and around the workplace
- Ensure regular building inspections are conducted
- Get expert advice on workplace safety and follow it

Non-Negotiable Employee Safety Habits

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Immediately report unsafe conditions to a supervisor
- Recognize and report safety hazards that could lead to slips, trips and falls
- Report all injuries and accidents to a supervisor
- Wear the correct protective equipment when required
- Learn how to correctly use equipment provided for safety purposes
- Be aware of and avoid actions that could endanger other people
- Take rest breaks during the day and some time off from work during the week

Tips

- Be aware of what emergency number to call at the time of a workplace emergency
- Practice evacuation drills regularly to avoid chaotic evacuations

6.1.3 Self Analysis – Attitude, Achievement Motivation: What is Self-Analysis

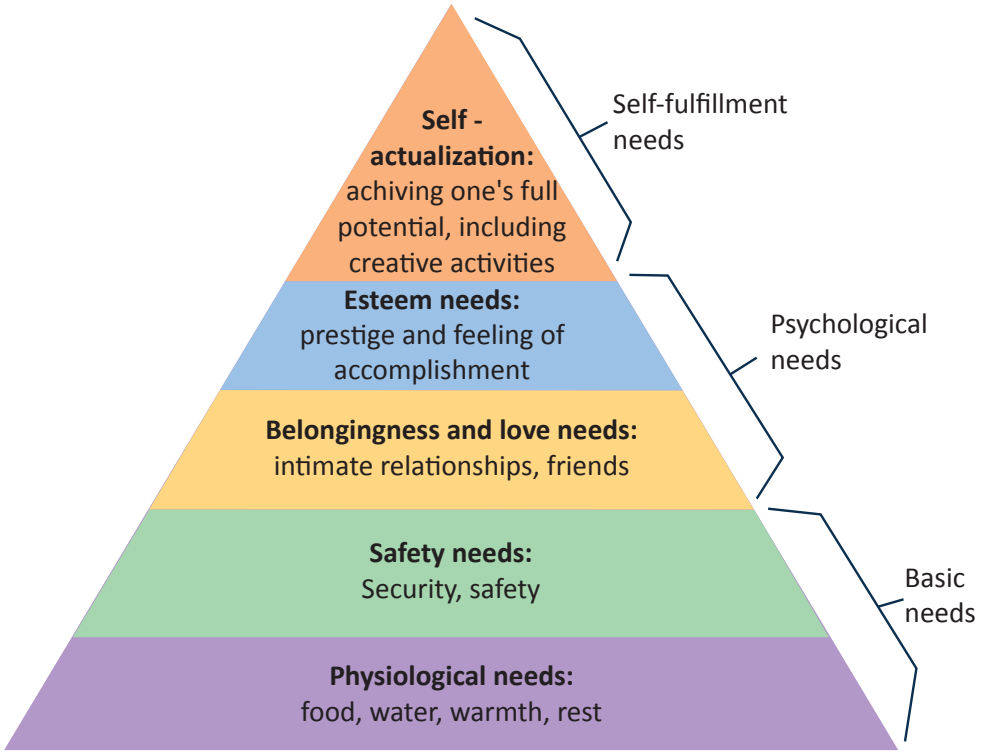
To truly achieve your full potential, you need to take a deep look inside yourself and find out what kind of person you really are. This attempt to understand your personality is known as self-analysis. Assessing yourself in this manner will help you grow, and will also help you to identify areas within yourself that need to be further developed, changed or eliminated. You can better understand yourself by taking a deep look at what motivates you, what your attitude is like, and what your strengths and weaknesses are.

What is Motivation?

Very simply put, motivation is your reason for acting or behaving in a certain manner. It is important to understand that not everyone is motivated by the same desires – people are motivated by many, many different things. We can understand this better by looking at Maslow's Hierarchy of Needs.

Maslow's Hierarchy of Needs

Famous American psychologist Abraham Maslow wanted to understand what motivates people. He believed that people have five types of needs, ranging from very basic needs (called physiological needs) to more important needs that are required for self-growth (called self-actualization needs). Between the physiological and self-actualization needs are three other needs – safety needs, belongingness and love needs, and esteem needs. These needs are usually shown as a pyramid with five levels and are known as Maslow's Hierarchy of Needs.



As you can see from the pyramid, the lowest level depicts the most basic needs. Maslow believed that our behaviour is motivated by our basic needs, until those needs are met. Once they are fulfilled, we move to the next level and are motived by the next level of needs. Let's understand this better with an example.

Rupa comes from a very poor family. She never has enough food, water, warmth or rest. According to Maslow, until Rupa is sure that she will get these basic needs, she will not even think about the next level of needs – her safety needs. But, once Rupa is confident that her basic needs will be met, she will move to the next level, and her behaviour will then be motivated by her need for security and safety. Once these new needs are met, Rupa will once again move to the next level, and be motivated by her need for relationships and friends. Once this need is satisfied, Rupa will then focus on the fourth level of needs – her esteem needs, after which she will move up to the fifth and last level of needs – the desire to achieve her full potential.

Understanding Achievement Motivation

We now know that people are motivated by basic, psychological and self-fulfillment needs. However, certain people are also motivated by the achievement of highly challenging accomplishments. This is known as Achievement Motivation, or 'need for achievement'.

The level of motivation achievement in a person differs from individual to individual. It is important that entrepreneurs have a high level of achievement motivation – a deep desire to accomplish something important and unique. It is equally important that they hire people who are also highly motivated by challenges and success.

What Motivates You?

What are the things that really motivate you? List down five things that really motivate you.

Remember to answer honestly!

I am motivated by:

Characteristics of Entrepreneurs with Achievement Motivation

Entrepreneurs with achievement motivation can be described as follows:

- Unafraid to take risks for personal accomplishment
- Love being challenged
- Future-oriented
- Flexible and adaptive
- Value negative feedback more than positive feedback
- Very persistent when it comes to achieving goals
- Extremely courageous
- Highly creative and innovative
- Restless - constantly looking to achieve more
- Feel personally responsible for solving problems

Think about it:

- How many of these traits do you have?
- Can you think of entrepreneurs who display these traits?

How to Cultivate a Positive Attitude

The good news is attitude is a choice. So it is possible to improve, control and change our attitude, if we decide we want to! The following tips help foster a positive mindset:

- Remember that you control your attitude, not the other way around
- Devote at least 15 minutes a day towards reading, watching or listening to something positive
- Avoid negative people who only complain and stop complaining yourself
- Expand your vocabulary with positive words and delete negative phrases from your mind
- Be appreciative and focus on what's good in yourself, in your life, and in others
- Stop thinking of yourself as a victim and start being proactive
- Imagine yourself succeeding and achieving your goals

What is Attitude?

Now that we understand why motivation is so important for self-analysis, let's look at the role our attitude plays in better understanding ourselves. Attitude can be described as your tendency (positive or negative), to think and feel about someone or something. Attitude is the foundation for success in every aspect of life. Our attitude can be our best friend or our worst enemy. In other words:

"The only disability in life is a bad attitude."

When you start a business, you are sure to encounter a wide variety of emotions, from difficult times and failures to good times and successes. Your attitude is what will see you through the tough times and guide you towards success. Attitude is also infectious. It affects everyone around you, from your customers to your employees to your investors. A positive attitude helps build confidence in the workplace while a negative attitude is likely to result in the demotivation of your people.

What Are Your Strengths and Weaknesses?

Another way to analyze yourself is by honestly identifying your strengths and weaknesses. This will help you use your strengths to your best advantage and reduce your weaknesses.

Note down all your strengths and weaknesses in the two columns below. Remember to be honest with yourself!

Strengths	Weaknesses

Tips

- Achievement motivation can be learned.
- Don’t be afraid to make mistakes.
- Train yourself to finish what you start.
- Dream big.

6.1.4 Honesty & Work Ethics: What is Honesty?

Honesty is the quality of being fair and truthful. It means speaking and acting in a manner that inspires trust. A person who is described as honest is seen as truthful and sincere, and as someone who isn't deceitful or devious and doesn't steal or cheat. There are two dimensions of honesty – one is honesty in communication and the other is honesty in conduct.

Honesty is an extremely important trait because it results in peace of mind and builds relationships that are based on trust. Being dishonest, on the other hand, results in anxiety and leads to relationships full of distrust and conflict.

Qualities of Honest People

Honest individuals have certain distinct characteristics. Some common qualities among honest people are:

1. They don't worry about what others think of them. They believe in being themselves – they don't bother about whether they are liked or disliked for their personalities.
2. They stand up for their beliefs. They won't think twice about giving their honest opinion, even if they are aware that their point of view lies with the minority.
3. They are think skinned. This means they are not affected by others judging them harshly for their honest opinions.
4. They forge trusting, meaningful and healthy friendships. Honest people usually surround themselves with honest friends. They have faith that their friends will be truthful and upfront with them at all times.

They are trusted by their peers. They are seen as people who can be counted on for truthful and objective feedback and advice.

- Honesty and employees: When entrepreneurs build honest relationships with their employees, it leads to more transparency in the workplace, which results in higher work performance and better results.
- Honesty and investors: For entrepreneurs, being honest with investors means not only sharing strengths but also candidly disclosing current and potential weaknesses, problem areas and solution strategies. Keep in mind that investors have a lot of experience with startups and are aware that all new companies have problems. Claiming that everything is perfectly fine and running smoothly is a red flag for most investors.
- Honesty with oneself: The consequences of being dishonest with oneself can lead to dire results, especially in the case of entrepreneurs. For entrepreneurs to succeed, it is critical that they remain realistic about their situation at all times, and accurately judge every aspect of their enterprise for what it truly is.

Importance of Honesty in Entrepreneurs

One of the most important characteristics of entrepreneurs is honesty. When entrepreneurs are honest with their customers, employees and investors, it shows that they respect those that they work with. It is also important that entrepreneurs remain honest with themselves. Let's look at how being honest would lead to great benefits for entrepreneurs.

- Honesty and customers: When entrepreneurs are honest with their customers it leads to stronger relationships, which in turn results in business growth and a stronger customer network.

What are Work Ethics?

Being ethical in the workplace means displaying values like honesty, integrity and respect in all your decisions and communications. It means not displaying negative qualities like lying, cheating and stealing.

Workplace ethics play a big role in the profitability of a company. It is as crucial to an enterprise as high morale and teamwork. This is why most companies lay down specific workplace ethic guidelines that must compulsorily be followed by their employees. These guidelines are typically outlined in a company's employee handbook.

Elements of a Strong Work Ethic

An entrepreneur must display strong work ethics, as well as hire only those individuals who believe in and display the same level of ethical behavior in the workplace. Some elements of a strong work ethic are:

- **Professionalism**: This involves everything from how you present yourself in a corporate setting to the manner in which you treat others in the workplace.
- **Respectfulness**: This means remaining poised and diplomatic regardless of how stressful or volatile a situation is.
- **Dependability**: This means always keeping your word, whether it's arriving on time for a meeting or delivering work on time.
- **Dedication**: This means refusing to quit until the designated work is done, and completing the work at the highest possible level of excellence.
- **Determination**: This means embracing obstacles as challenges rather than letting them stop you, and pushing ahead with purpose and resilience to get the desired results.
- **Accountability**: This means taking responsibility for your actions and the consequences of your actions, and not making excuses for your mistakes.
- **Humility**: This means acknowledging everyone's efforts and had work, and sharing the credit for accomplishments.

How to Foster a Good Work Ethic

As an entrepreneur, it is important that you clearly define the kind of behaviour that you expect from each and every team member in the workplace. You should make it clear that you expect employees to display positive work ethics like:

- **Honesty**: All work assigned to a person should be done with complete honesty, without any deceit or lies.
- **Good attitude**: All team members should be optimistic, energetic, and positive.
- **Reliability**: Employees should show up where they are supposed to be, when they are supposed to be there.
- **Good work habits**: Employees should always be well groomed, never use inappropriate language, conduct themselves professionally at all times, etc.
- **Initiative**: Doing the bare minimum is not enough. Every team member needs to be proactive and show initiative.
- **Trustworthiness**: Trust is non-negotiable. If an employee cannot be trusted, it's time to let that employee go.

- **Respect**: Employees need to respect the company, the law, their work, their colleagues and themselves.
- **Integrity**: Each and every team member should be completely ethical and must display above board behaviour at all times.
- **Efficiency**: Efficient employees help a company grow while inefficient employees result in a waste of time and resources.

Tips

- Don't get angry when someone tells you the truth and you don't like what you hear.
- Always be willing to accept responsibility for your mistakes.

6.1.5 Creativity & Innovation : What is Creativity

Creativity means thinking outside the box. It means viewing things in new ways or from different perspectives, and then converting these ideas into reality. Creativity involves two parts: thinking and producing. Simply having an idea makes you imaginative, not creative. However, having an idea and acting on it makes you creative.

Characteristics of Highly Creative People

Some characteristics of creative people are:

- They are imaginative and playful
- They see issues from different angles
- They notice small details
- They have very little tolerance for boredom
- They detest rules and routine
- They love to daydream
- They are very curious

What is Innovation?

There are many different definitions of innovation. In simple terms, innovation means turning an idea into a solution that adds value. It can also mean adding value by implementing a new product, service or process, or significantly improving on an existing product, service or process.

Characteristics of Highly Innovative People

Some characteristics of highly innovative people are:

- They embrace doing things differently
- They don't believe in taking shortcuts
- They are not afraid to be unconventional
- They are highly proactive and persistent
- They are organized, cautious and risk-averse

Tips

- Take regular breaks from your creative work to recharge yourself and gain fresh perspective.
- Build prototypes frequently, test them out, get feedback, and make the required changes.

6.1.6 Time Management: What is Time Management?

Time management is the process organizing your time, and deciding how to allocate your time between different activities. Good time management is the difference between working smart (getting more done in less time) and working hard (working for more time to get more done).

Effective time management leads to an efficient work output, even when you are faced with tight deadlines and high pressure situations. On the other hand, not managing your time effectively results in inefficient output and increases stress and anxiety.

Benefits of Time Management

Time management can lead to huge benefits like:

- Greater productivity
- Better professional reputation
- Higher chances for career advancement
- Higher efficiency
- Reduced stress
- Greater opportunities to achieve goals

Not managing time effectively can result in undesirable consequences like:

- Missing deadlines
- Substandard work quality
- Stalled career
- Inefficient work output
- Poor professional reputation
- Increase in stress and anxiety

Traits of Effective Time Managers

Some traits of effective time managers are:

- They begin projects early
- They set daily objectives
- They modify plans if required, to achieve better results
- They are flexible and open-minded
- They inform people in advance if their help will be required
- They know how to say no
- They break tasks into steps with specific deadlines
- They continually review long term goals
- They think of alternate solutions if and when required
- They ask for help when required
- They create backup plans

Effective Time Management Techniques

You can manage your time better by putting into practice certain time management techniques. Some helpful tips are:

- Plan out your day as well as plan for interruptions. Give yourself at least 30 minutes to figure out your time plan. In your plan, schedule some time for interruptions.
- Put up a “Do Not Disturb” sign when you absolutely have to complete a certain amount of work.
- Close your mind to all distractions. Train yourself to ignore ringing phones, don’t reply to chat messages and disconnect from social media sites.

- Delegate your work. This will not only help your work get done faster, but will also show you the unique skills and abilities of those around you.
- Stop procrastinating. Remind yourself that procrastination typically arises due to the fear of failure or the belief that you cannot do things as perfectly as you wish to do them.
- Prioritize. List each task to be completed in order of its urgency or importance level. Then focus on completing each task, one by one.
- Maintain a log of your work activities. Analyze the log to help you understand how efficient you are, and how much time is wasted every day.
  Create time management goals to reduce time wastage.

Tips

- Always complete the most important tasks first.
- Get at least 7 – 8 hours of sleep every day.
- Start your day early.
- Don’t waste too much time on small, unimportant details.
- Set a time limit for every task that you will undertake.
- Give yourself some time to unwind between tasks.

6.1.7 Anger Management: What is Anger Management

Anger management is the process of:

1. Learning to recognize the signs that you, or someone else, is becoming angry
2. Taking the best course of action to calm down the situation in a positive way

Anger management does not mean suppressing anger.

Importance of Anger Management

Anger is a perfectly normal human emotion. In fact, when managed the right way, anger can be considered a healthy emotion. However, if it is not kept in check, anger can make us act inappropriately and can lead to us saying or doing things that we will likely later regret.
Extreme anger can:

- **Hurt you physically:** It leads to heart disease, diabetes, a weakened immune system, insomnia, and high blood pressure.
- **Hurt you mentally**: It can cloud your thinking and lead to stress, depression and mental health issues.
- **Hurt your career**: It can result in alienating your colleagues, bosses, clients and lead to the loss of respect.
- **Hurt your relationships**: It makes it hard for your family and friends to trust you, be honest with you and feel comfortable around you.
  This is why anger management, or managing anger appropriately, is so important.

Anger Management Strategies

Here are some strategies that can help you control your anger:

Strategy 1: Relaxation

Something as simple as breathing deeply and looking at relaxing images works wonders in calming down angry feelings. Try this simple breathing exercise:

1. Take a deep breath from your diaphragm (don't breathe from your chest)
2. Visualize your breath coming up from your stomach
3. Keep repeating a calming word like 'relax' or 'take it easy' (remember to keep breathing deeply while repeating the word)
4. Picture a relaxing moment (this can be from your memory or your imagination)

Follow this relaxation technique daily, especially when you realize that you're starting to feel angry.

Strategy 2: Cognitive Restructuring

Cognitive restructuring means changing the manner in which you think. Anger can make you curse, swear, exaggerate and act very dramatically. When this happens, force yourself to replace your angry thoughts with more logical ones. For instance, instead of thinking 'Everything is ruined' change your mindset and tell yourself 'It's not the end of the world and getting angry won't solve this'.

Strategy 3: Problem Solving

Getting angry about a problem that you cannot control is a perfectly natural response. Sometimes, try as you may, there may not be a solution to the difficulty you are faced with. In such cases, stop focusing on solving the problem, and instead focus on handling and facing the problem. Remind yourself that you will do your best to deal with the situation, but that you will not blame yourself if you don't get the solution you desire.

Strategy 4: Better Communication

When you're angry, it is very easy to jump to inaccurate conclusions. In this case, you need to force yourself to stop reacting, and think carefully about what you want to say, before saying it. Avoid saying the first thing that enters your head. Force yourself to listen carefully to what the other person is saying. Then think about the conversation before responding.

Strategy 5: Changing Your Environment

If you find that your environment is the cause of your anger, try and give yourself a break from your surroundings. Make an active decision to schedule some personal time for yourself, especially on days that are very hectic and stressful. Having even a brief amount of quiet or alone time is sure to help calm you down.

Tips for Anger Management

- The following tips will help you keep your anger in check:
- Take some time to collect your thoughts before you speak out in anger.
- Express the reason for your anger in an assertive, but non-confrontational manner once you have calmed down.
- Do some form of physical exercise like running or walking briskly when you feel yourself getting angry.
- Make short breaks part of your daily routine, especially during days that are stressful. Focus on how to solve a problem that's making you angry, rather than focusing on the fact that the problem is making you angry.

Tips

- Try to forgive those who anger you, rather than hold a grudge against them.
- Avoid using sarcasm and hurling insults. Instead, try and explain the reason for your frustration in a polite and mature manner.

6.1.8 Stress Management: What is Stress

We say we are 'stressed' when we feel overloaded and unsure of our ability to deal with the pressures placed on us. Anything that challenges or threatens our well-being can be defined as a stress. It is important to note that stress can be good and bad. While good stress keeps us going, negative stress undermines our mental and physical health. This is why it is so important to manage negative stress effectively.

Causes of Stress

Stress can be caused by internal and external factors.

Internal causes of stress

- Constant worry
- Rigid thinking
- Unrealistic expectations
- Pessimism
- Negative self-talk
- All in or all out attitude

External causes of stress

- Major life changes
- Difficulties with relationships
- Having too much to do
- Difficulties at work or in school
- Financial difficulties
- Worrying about one's children and/or family

Symptoms of Stress

Stress can manifest itself in numerous ways. Take a look at the cognitive, emotional, physical and behavioral symptoms of stress.

Cognitive Symptoms	Emotional Symptoms
• Memory problems	• Depression
• Concentration issues	• Agitation
• Lack of judgement	• Irritability
• Pessimism	• Loneliness
• Anxiety	• Anxiety
• Constant worrying	• Anger

Physical Symptoms	Behavioral Symptoms
• Aches and pain	• Increase or decrease in appetite
• Diarrhea or constipation	• Over sleeping or not sleeping enough
• Nausea	• Withdrawing socially
• Dizziness	• Ignoring responsibilities
• Chest pain and/or rapid heartbeat	• Consumption of alcohol or cigarettes
• Frequent cold or flu like feelings	• Nervous habits like nail biting, pacing etc.

Tips to Manage Stress

The following tips can help you manage your stress better:

- Note down the different ways in which you can handle the various sources of your stress.
- Remember that you cannot control everything, but you can control how you respond.
- Discuss your feelings, opinions and beliefs rather than reacting angrily, defensively or passively.
- Practice relaxation techniques like meditation, yoga or tai chi when you start feeling stressed.
- Devote a part of your day towards exercise.
- Eat healthy foods like fruits and vegetables. Avoid unhealthy foods especially those containing large amounts of sugar.
- Plan your day so that you can manage your time better, with less stress.
- Say no to people and things when required.
- Schedule time to pursue your hobbies and interests.
- Ensure you get at least 7-8 hours of sleep.
- Reduce your caffeine intake.
- Increase the time spent with family and friends.

Tips

- Force yourself to smile even if you feel stressed. Smiling makes us feel relaxed and happy.
- Stop yourself from feeling and thinking like a victim. Change your attiude and focus on being proactive.

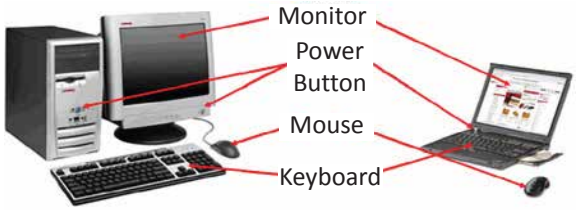
6.2. Digital Literacy: A Recap

Unit Objectives

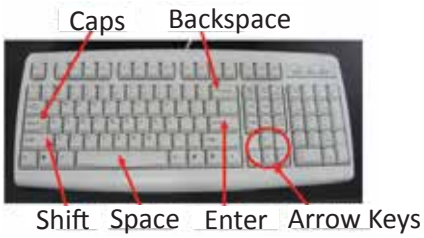
At the end of this unit, you will be able to:

1. Identify the basic parts of a computer
2. Identify the basic parts of a keyboard
3. Recall basic computer terminology
4. Recall basic computer terminology
5. Recall the functions of basic computer keys
6. Discuss the main applications of MS Office
7. Discuss the benefits of Microsoft Outlook
8. Discuss the different types of e-commerce
9. List the benefits of e-commerce for retailers and customers
10. Discuss how the Digital India campaign will help boost e-commerce in India
11. Describe how you will sell a product or service on an e-commerce platform

6.2.1 Computer and Internet basics: Basic Parts of a Computer



Basic Parts of a Keyboard



Basic Parts of a Computer

- **Central Processing Unit (CPU)**: The brain of the computer. It interprets and carries out program instructions.
- **Hard Drive**: A device that stores large amounts of data.
- **Monitor**: The device that contains the computer screen where the information is visually displayed.
- **Desktop**: The first screen displayed after the operating system loads.
- **Background**: The image that fills the background of the desktop.

Basic Parts of a Computer

- **Mouse**: A hand-held device used to point to items on the monitor.
- **Speakers**: Devices that enable you to hear sound from the computer.
- **Printer**: A device that converts output from a computer into printed paper documents.
- **Icon**: A small picture or image that visually represents something on your computer.
- **Cursor**: An arrow which indicates where you are positioned on the screen.
- **Program Menu**: A list of programs on your computer that can be accessed from the Start menu.
- **Taskbar**: The horizontal bar at the bottom of the computer screen that lists applications that are currently in use.
- **Recycle Bin**: A temporary storage for deleted files.

Basic Internet Terms

- **The Internet** : A vast, international collection of computer networks that transfers information.
- **The World Wide Web**: A system that lets you access information on the Internet.
- **Website**: A location on the World Wide Web (and Internet) that contains information about a specific topic.
- **Homepage**: Provides information about a website and directs you to other pages on that website.
- **Link/Hyperlink**: A highlighted or underlined icon, graphic, or text that takes you to another file or object.
- **Web Address/URL**: The address for a website.
- **Address Box**: A box in the browser window where you can type in a web address.

Basic Computer Keys

- **Arrow Keys**: Press these keys to move your cursor.
- **Space bar**: Adds a space.
- **Enter/Return**: Moves your cursor to a new line.
- **Shift**: Press this key if you want to type a capital letter or the upper symbol of a key.
- **Caps Lock**: Press this key if you want all the letters you type to be capital letters. Press it again to revert back to typing lowercase letters.
- **Backspace**: Deletes everything to the left of your cursor.

Tips 

- When visiting a .com address, there no need to type http:// or even www. Just type the name of the website and then press Ctrl + Enter. (Example: Type 'apple' and press Ctrl + Enter to go to www.apple.com)
- Press the Ctrl key and press the + or - to increase and decrease the size of text.
- Press F5 or Ctrl + R to refresh or reload a web page.

6.2.2 MS Office and Email: About MS Office

MS Office or Microsoft Office is a suite of computer programs developed by Microsoft. Although meant for all users, it offers different versions that cater specifically to students, home users and business users. All the programs are compatible with both, Windows and Macintosh.

Most Popular Office Products

Some of the most popular and universally used MS Office applications are:

- **Microsoft Word**: Allows users to type text and add images to a document.
- **Microsoft Excel**: Allows users to enter data into a spreadsheet and create calculations and graphs.
- **Microsoft PowerPoint**: Allows users to add text, pictures and media and create slideshows and presentations.
- **Microsoft Outlook**: Allows users to send and receive email.
- **Microsoft OneNote**: Allows users to make drawings and notes with the feel of a pen on paper.
- **Microsoft Access**: Allows users to store data over many tables.

Why Choose Microsoft Outlook

A popular email management choice especially in the workplace, Microsoft Outlook also includes an address book, notebook, web browser and calendar. Some major benefits of this program are:

- **Integrated search function**: You can use keywords to search for data across all Outlook programs.
- **Enhanced security**: Your email is safe from hackers, junk mail and phishing website email.
- **Email syncing**: Sync your mail with your calendar, contact list, notes in One Note and…your phone!
- **Offline access to email**: No Internet? No problem! Write emails offline and send them when you're connected again.

Tips

- Press Ctrl+R as a shortcut method to reply to email.
- Set your desktop notifications only for very important emails.
- Flag messages quickly by selecting messages and hitting the Insert key.
- Save frequently sent emails as a template to reuse again and again.
- Conveniently save important emails as files.

6.2.3 E -Commerce: What is E-Commerce

E-commerce is the buying or selling of goods and services, or the transmitting of money or data, electronically on the internet. E-Commerce is the short form for "electronic commerce."

Examples of E-Commerce

Some examples of e-commerce are:

- Online shopping
- Online auctions
- Online ticketing
- Electronic payments
- Internet banking

Types of E-Commerce

E-commerce can be classified based on the types of participants in the transaction. The main types of e-commerce are:

- **Business to Business (B2B)**: Both the transacting parties are businesses.
- **Business to Consumer (B2C)**: Businesses sell electronically to end-consumers.
- **Consumer to Consumer (C2C):** Consumers come together to buy, sell or trade items to other consumers.
- **Consumer-to-Business (C2B)**: Consumers make products or services available for purchase to companies looking for exactly those services or products.
- **Business-to-Administration (B2A)**: Online transactions conducted between companies and public administration.
- **Consumer-to-Administration (C2A)**: Online transactions conducted between individuals and public administration.

Benefits of E-Commerce

The e-commerce business provides some benefits for retailers and customers.

Benefits for retailers:

- Establishes an online presence
- Reduces operational costs by removing overhead costs
- Increases brand awareness through the use of good keywords
- Increases sales by removing geographical and time constraints

Benefits for customers:

- Offers a wider range of choice than any physical store
- Enables goods and services to be purchased from remote locations
- Enables consumers to perform price comparisons

Digital India Campaign

Prime Minister Narendra Modi launched the Digital India campaign in 2015, with the objective of offering every citizen of India access to digital services, knowledge and information. The campaign aims to improve the country's online infrastructure and increase internet connectivity, thus boosting the e-commerce industry.

Currently, the majority of online transactions come from tier 2 and tier 3 cities. Once the Digital India campaign is in place, the government will deliver services through mobile connectivity, which will help deliver internet to remote corners of the country. This will help the e-commerce market to enter India's tier 4 towns and rural areas.

E-Commerce Activity

Choose a product or service that you want to sell online. Write a brief note explaining how you will use existing e-commerce platforms, or create a new e-commerce platform, to sell your product or service.

Tips

- Before launching your e-commerce platform, test everything.
- Pay close and personal attention to your social media.

6.3: Money Matters

Unit Objectives

At the end of this unit, you will be able to:

1. Discuss the importance of saving money
2. Discuss the benefits of saving money
3. Discuss the main types of bank accounts
4. Describe the process of opening a bank account
5. Differentiate between fixed and variable costs
6. Describe the main types of investment options
7. Describe the different types of insurance products
8. Describe the different types of taxes
9. Discuss the uses of online banking
10. Discuss the main types of electronic funds transfers

6.3.1 Personal Finance – Why to Save: Importance of Saving

We all know that the future is unpredictable. You never know what will happen tomorrow, next week or next year. That's why saving money steadily through the years is so important. Saving money will help improve your financial situation over time. But more importantly, knowing that you have money stashed away for an emergency will give you peace of mind. Saving money also opens the door to many more options and possibilities.

Benefits of Saving

Inculcating the habit of saving leads to a vast number of benefits. Saving helps you:

- **Become financially independent**: When you have enough money saved up to feel secure you can start making your choices, from taking a vacation whenever you want, to switching careers or starting your own business.
- **Invest in yourself through education**: Through saving, you can earn enough to pay up for courses that will add to your professional experience and ultimately result in higher paying jobs.
- **Get out of debt**: Once you have saved enough as a reserve fund, you can use your savings to pay off debts like loans or bills that have accumulated over time.
- **Be prepared for surprise expenses** : Having money saved enables you to pay for unforeseen expenses like sudden car or house repairs, without feeling financially stressed.
- **Pay for emergencies**: Saving helps you deal with emergencies like sudden health issues or emergency trips without feeling financially burdened.

- **Afford large purchases and achieve major goals:** Saving diligently makes it possible to place down payments towards major purchases and goals, like buying a home or a car.
- **Retire**: The money you have saved over the years will keep you comfortable when you no longer have the income you would get from your job.

Tips

- Break your spending habit. Try not spending on one expensive item per week, and put the money that you would have spent into your savings.
- Decide that you will not buy anything on certain days or weeks and stick to your word.

6.3.2 Types of Bank Accounts, Opening a Bank Account: Types of Bank Accounts

In India, banks offer four main types of bank accounts. These are:

- Current Accounts
- Savings Accounts
- Recurring Deposit Accounts
- Fixed Deposit Accounts

Current Accounts

Current accounts offer the most liquid deposits and thus, are best suited for businessmen and companies. As these accounts are not meant for investments and savings, there is no imposed limit on the number or amount of transactions that can be made on any given day. Current account holders are not paid any interest on the amounts held in their accounts. They are charged for certain services offered on such accounts.

Savings Accounts

Savings accounts are meant to promote savings, and are therefore the number one choice for salaried individuals, pensioners and students. While there is no restriction on the number and amount of deposits made, there are usually restrictions on the number and amount of withdrawals. Savings account holders are paid interest on their savings.

Recurring Deposit Accounts

Recurring Deposit accounts, also called RD accounts, are the accounts of choice for those who want to save an amount every month, but are unable to invest a large sum at one time. Such account holders deposit a small, fixed amount every month for a pre-determined period (minimum 6 months). Defaulting on a monthly payment results in the account holder being charged a penalty amount. The total amount is repaid with interest at the end of the specified period.

Fixed Deposit Accounts

Fixed Deposit accounts, also called FD accounts, are ideal for those who wish to deposit their savings for a long term in return for a high rate of interest. The rate of interest offered depends on the amount deposited and the time period, and also differs from bank to bank. In the case of an FD, a certain amount of money is deposited by the account holder for a fixed period of time. The money can be withdrawn when the period expires. If necessary, the depositor can break the fixed deposit prematurely. However, this usually attracts a penalty amount which also differs from bank to bank.

Opening a Bank Account

Opening a bank account is quite a simple process. Take a look at the steps to open an account of your own:

Step 1: Fill in the Account Opening Form

This form requires you to provide the following information:

- Personal details (name, address, phone number, date of birth, gender, occupation, address)
- Method of receiving your account statement (hard copy/email)
- Details of your initial deposit (cash/cheque)
- Manner of operating your account (online/mobile banking/traditional via cheque, slip books)

Ensure that you sign wherever required on the form.

Step 2: Affix your Photograph

Stick a recent photograph of yourself in the allotted space on the form.

Step 3: Provide your Know Your Customer (KYC) Details

KYC is a process that helps banks verify the identity and address of their customers. To open an account, every individual needs to submit certain approved documents with respect to photo identity (ID) and address proof. Some Officially Valid Documents (OVDs) are:

- Passport
- Driving License
- Voters' Identity Card
- PAN Card
- UIDAI (Aadhaar) Card

Step 4: Submit All your Documents

Submit the completed Account Opening Form and KYC documents. Then wait until the forms are processed and your account has been opened!

Tips

- Select the right type of account.
- Fill in complete nomination details.
- Ask about fees.
- Understand the rules.
- Check for online banking – it's convenient!
- Keep an eye on your bank balance.

6.3.3 Costs: Fixed vs Variable: What are Fixed and Variable Costs

Fixed costs and variable costs together make up a company's total cost. These are the two types of costs that companies have to bear when producing goods and services.

A fixed cost does not change with the volume of goods or services a company produces. It always remains the same.

A variable cost, on the other hand, increases and decreases depending on the volume of goods and services produced. In other words, it varies with the amount produced.

Differences Between Fixed and Variable Costs

Let's take a look at some of the main differences between fixed and variable costs:

Criteria	Fixed Costs	Variable Costs
Meaning	A cost that stays the same, regardless of the output produced.	A cost that changes when the
Nature	Time related.	Volume related.
Incurred	Incurred irrespective of units being produced.	Incurred only when units are produced.
Unit cost	Inversely proportional to the number of units produced.	Remains the same, per unit.
Examples	Depreciation, rent, salary, insurance, tax etc.	Material consumed, wages, commission on sales, packing expenses, etc.

Tips

- When trying to determine whether a cost is fixed or variable, simply ask the following question: Will the particular cost change if the company stopped its production activities? If the answer is no, then it is a fixed cost. If the answer is yes, then it is probably a variable cost.

6.3.4 Investment, Insurance and Taxes:

Investment

Investment means that money is spent today with the aim of reaping financial gains at a future time. The main types of investment options are as follows:

- **Bonds:** Bonds are instruments used by public and private companies to raise large sums of money – too large to be borrowed from a bank. These bonds are then issued in the public market and are bought by lenders.
- **Stocks:** Stocks or equity are shares that are issued by companies and are bought by the general public.
- **Small Savings Schemes:** Small Savings Schemes are tools meant to save money in small amounts. Some popular schemes are the Employees Provident Fund, Sukanya Samriddhi Scheme and National Pension Scheme.
- **Mutual Funds:** Mutual Funds are professionally managed financial instruments that invest money in different securities on behalf of investors.
- **Fixed Deposits:** A fixed amount of money is kept aside with a financial institution for a fixed amount of time in return for interest on the money.
- **Real Estate:** Loans are taken from banks to purchase real estate, which is then leased or sold with the aim of making a profit on the appreciated property price.
- **Hedge Funds:** Hedge funds invest in both financial derivatives and/or publicly traded securities.
- **Private Equity:** Private Equity is trading in the shares of an operating company that is not publicly listed and whose shares are not available on the stock market.
- **Venture Capital:** Venture Capital involves investing substantial capital in a budding company in return for stocks in that company.

Insurance

There are two types of insurance – Life Insurance and Non-Life or General Insurance.

Life Insurance

Life Insurance deals with all insurance covering human life.

Life Insurance Products

The main life insurance products are:

- **Term Insurance:** This is the simplest and cheapest form of insurance. It offers financial protection for a specified tenure, say 15 to 20 years. In the case of your death, your family is paid the sum assured. In the case of your surviving the term, the insurer pays nothing.
- **Endowment Policy:** This offers the dual benefit of insurance and investment. Part of the premium is allocated towards the sum assured, while the remaining premium gets invested in equity and debt. It pays a lump sum amount after the specified duration or on the death of the policyholder, whichever is earlier.
- **Unit-Linked Insurance Plan (ULIP):** Here part of the premium is spent on the life cover, while the remaining amount is invested in equity and debt. It helps develop a regular saving habit.

- **Money Back Life Insurance:**While the policyholder is alive, periodic payments of the partial survival benefits are made during the policy tenure. On the death of the insured, the insurance company pays the full sum assured along with survival benefits.
- **Whole Life Insurance:** It offers the dual benefit of insurance and investment. It offers insurance cover for the whole life of the person or up to 100 years whichever is earlier.

General Insurance

General Insurance deals with all insurance covering assets like animals, agricultural crops, goods, factories, cars and so on.

General Insurance Products

The main general insurance products are:

- **Motor Insurance:** This can be divided into Four Wheeler Insurance and Two Wheeler Insurance.
- **Health Insurance:** The main types of health insurance are individual health insurance, family floater health insurance, comprehensive health insurance and critical illness insurance.
- **Travel Insurance:** This can be categorised into Individual Travel Policy, Family Travel Policy, Student Travel Insurance and Senior Citizen Health Insurance.
- **Home Insurance:** This protects the house and its contents from risk.
- **Marine Insurance:** This insurance covers goods, freight, cargo etc. against loss or damage during transit by rail, road, sea and/or air.

Taxes

There are two types of taxes – Direct Taxes and Indirect Taxes.

Direct Tax

Direct taxes are levied directly on an entity or a person and are non-transferrable.

Some examples of Direct Taxes are:

- **Income Tax:** This tax is levied on your earning in a financial year. It is applicable to both, individuals and companies.
- **Capital Gains Tax:** This tax is payable whenever you receive a sizable amount of money. It is usually of two types – short term capital gains from investments held for less than 36 months and long term capital gains from investments held for longer than 36 months.
- **Securities Transaction Tax:** This tax is added to the price of a share. It is levied every time you buy or sell shares.
- **Perquisite Tax:** This tax is levied is on perks that have been acquired by a company or used by an employee.
- **Corporate Tax:** Corporate tax is paid by companies from the revenue they earn.

Indirect Tax

Indirect taxes are levied on goods or services.

Some examples of Indirect Taxes are:

- **Sales Tax:** Sales Tax is levied on the sale of a product.

- **Service Tax:** Service Tax is added to services provided in India.
- **Value Added Tax:** Value Added Tax is levied at the discretion of the state government. The tax is levied on goods sold in the state. The tax amount is decided by the state.
- **Customs Duty & Octroi:** Customs Duty is a charge that is applied on purchases that are imported from another country. Octroi is levied on goods that cross state borders within India.
- **Excise Duty:** Excise Duty is levied on all goods manufactured or produced in India.

Tips

- Think about how quickly you need your money back and pick an investment option accordingly.
- Ensure that you are buying the right type of insurance policy for yourself.
- Remember, not paying taxes can result in penalties ranging from fines to imprisonment.

6.3.5 Online Banking, NEFT, RTGS etc.: What is Online Banking

Internet or online banking allows account holders to access their account from a laptop at any location. In this way, instructions can be issued. To access an account, account holders simply need to use their unique customer ID number and password.

Internet banking can be used to:

- Find out an account balance
- Transfer amounts from one account to another
- Arrange for the issuance of cheques
- Instruct payments to be made
- Request for a cheque book
- Request for a statement of accounts
- Make a fixed deposit

Electronic Funds Transfers

Electronic funds transfer is a convenient way of transferring money from the comfort of one's own home, using integrated banking tools like internet and mobile banking.

Transferring funds via an electronic gateway is extremely convenient. With the help of online banking, you can choose to:

- Transfer funds into your own accounts of the same bank.
- Transfer funds into different accounts of the same bank.
- Transfer funds into accounts in different banks, using NEFT.
- Transfer funds into other bank accounts using RTGS.
- Transfer funds into various accounts using IMPS.

NEFT

NEFT stands for National Electronic Funds Transfer. This money transfer system allows you to electronically transfer funds from your respective bank accounts to any other account, either in the same bank or belonging to any other bank. NEFT can be used by individuals, firms and corporate organizations to transfer funds between accounts.

In order to transfer funds via NEFT, two things are required:

- A transferring bank
- A destination bank

Before you can transfer funds through NEFT, you will need to register the beneficiary who will be receiving the funds. In order to complete this registration, you will require the following

- Recipient's name
- Recipient's account number
- Recipient's bank's name
- Recipient's bank's IFSC code

RTGS

RTGS stands for Real Time Gross Settlement. This is a real time funds transfer system which enables you to transfer funds from one bank to another, in real time or on a gross basis. The transferred amount is immediately deducted from the account of one bank, and instantly credited to the other bank's account. The RTGS payment gateway is maintained by the Reserve Bank of India. The transactions between banks are made electronically.

RTGS can be used by individuals, companies and firms to transfer large sums of money. Before remitting funds through RTGS, you will need to add the beneficiary and his bank account details via your online banking account. In order to complete this registration, you will require the following information:

- Name of the beneficiary
- Beneficiary's account number
- Beneficiary's bank address
- Beneficiary's bank's IFSC code

IMPS

IMPS stands for Immediate Payment Service. This is a real-time, inter-bank, electronic funds transfer system used to transfer money instantly within banks across India. IMPS enables users to make instant electronic transfer payments using mobile phones through both, Mobile Banking and SMS. It can also be used through ATMs and online banking. IMPS is available 24 hours a day and 7 days a week. The system features a secure transfer gateway and immediately confirms orders that have been fulfilled.

To transfer money through IMPS, the you need to:

- Register for IMPS with your bank
- Receive a Mobile Money Identifier (MMID) from the bank
- Receive a MPIN from the bank

Once you have both these, you can login or make a request through SMS to transfer a particular amount to a beneficiary.

For the beneficiary to receive the transferred money, he must:

1. Link his mobile number with his respective account
2. Receive the MMID from the bank

In order to initiate a money transfer through IMPS, you will need to enter the following information:

1. The beneficiary's mobile number
2. The beneficiary's MMID
3. The transfer amount
4. Your MPIN

As soon as money has been deducted from your account and credited into the beneficiary's account, you will be sent a confirmation SMS with a transaction reference number, for future reference.

Differences Between NEFT, RTGS & IMPS

Criteria	NEFT	RTGS	IMPS
Settlement	Done in batches	Real-time	Real-time
Full form	National Electronic Fund Transfer	Real Time Gross Settlement	Immediate Payment Service
Timings on Monday – Friday	8:00 am – 6:30 pm	9:00 am – 4:30 pm	24x7
Timings on Saturday	8:00 am – 1:00 pm	9:00 am – 1:30 pm	24x7
Minimum amount of money transfer limit	` 1	` 2 lacs	` 1
Maximum amount of money transfer limit	` 10 lacs	` 10 lacs per day	` 2 lacs
Maximum charges as per RBI	Upto 10,000 – ` 2.5 above 10,000 – 1 lac – ` 5 above 1 – 2 lacs – ` 15 above 2 – 5 lacs – ` 25 above 5 – 10 lacs – ` 25	above 2 – 5 lacs – ` 25 above 5 – 10 lacs – ` 50	Upto 10,000 – ` 5 above 10,000 – 1 lac – ` 5 above 1 – 2 lacs – ` 15

Tips

- Never click on any links in any e-mail message to access your online banking website.
- You will never be asked for your credit or debit card details while using online banking.
- Change your online banking password regularly.

6.4. Preparing for Employment & Self Employment

Unit Objectives

At the end of this unit, you will be able to:

1. Discuss the steps to prepare for an interview
2. Discuss the steps to create an effective Resume
3. Discuss the most frequently asked interview questions
4. Discuss how to answer the most frequently asked interview questions
5. Discuss basic workplace terminology

6.4.1 Interview Preparation: How to Prepare for an Interview

The success of your getting the job that you want depends largely on how well your interview for that job goes. Therefore, before you go in for your interview, it is important that you prepare for it with a fair amount of research and planning. Take a look at the steps to follow in order to be well prepared for an interview:

1. **Research the organization that you are having the interview with.**
   - Studying the company beforehand will help you be more prepared at the time of the interview. Your knowledge of the organization will help you answer questions at the time of the interview, and will leave you looking and feeling more confident. This is sure to make you stand out from other, not as well informed, candidates.
   - Look for background information on the company. Ty and find an overview of the company and its industry profile.
   - Visit the company website to get a good idea of what the company does. A company website offers a wealth of important information. Read and understand the company's mission statement. Pay attention to the company's products/services and client list. Read through any press releases to get an idea of the company's projected growth and stability.
   - Note down any questions that you have after your research has been completed.
2. **Think about whether your skills and qualifications match the job requirements.**
   - Carefully read through and analyze the job description.
   - Make a note of the knowledge, skills and abilities required to fulfill the job requirements.
   - Take a look at the organization hierarchy. Figure out where the position you are applying for fits into this hierarchy.
3. **Go through the most typical interview questions asked, and prepare your responses.**
   - Remember, in most interviews a mix of resume-based, behavioral and case study questions are asked.
   - Think about the kind of answers you would like to provide to typical questions asked in these three areas.
   - Practice these answers until you can express them confidently and clearly.

4. **Plan your attire for the interview.**
   - It is always safest to opt for formal business attire, unless expressly informed to dress in business casual (in which case you should use your best judgement).
   - Ensure that your clothes are clean and well-ironed. Pick neutral colours – nothing too bright or flashy.
   - The shoes you wear should match your clothes, and should be clean and suitable for an interview.
   - Remember, your aim is to leave everyone you meet with the impression that you are a professional and highly efficient person.
5. **Ensure that you have packed everything that you may require during the interview.**
   - Carry a few copies of your resume. Use a good quality paper for your resume print outs.
   - Always take along a notepad and a pen.
   - Take along any information you may need to refer to, in order to fill out an application form.
   - Carry a few samples of your work, if relevant.
6. **Remember the importance of non-verbal communication.**
   - Practice projecting confidence. Remind yourself to smile and make eye contact. Practice giving a firm handshake.
   - Keep in mind the importance of posture. Practice sitting up straight. Train yourself to stop nervous gestures like fidgeting and foot-tapping.
   - Practice keeping your reactions in check. Remember, your facial expressions provide a good insight into your true feelings. Practice projecting a positive image.
7. **Make a list of questions to end the interview with.**
   - Most interviews will end with the interviewer(s) asking if you have any questions. This is your chance to show that you have done your research and are interested in learning more about the company.
   - If the interviewer does not ask you this question, you can inform him/her that you have some queries that you would like to discuss. This is the time for you to refer to the notes you made while studying the company.
   - Some good questions to ask at this point are:
     - What do you consider the most important criteria for success in this job?
     - How will my performance be evaluated?
     - What are the opportunities for advancement?
     - What are the next steps in the hiring process?
   - Remember, never ask for information that is easily available on the company website.

Tips

- Ask insightful and probing questions.
- When communicating, use effective forms of body language like smiling, making eye contact, and actively listening and nodding. Don't slouch, play with nearby items, fidget, chew gum, or mumble.

6.4.2 Preparing an Effective Resume: How to Create an Effective Resume

A resume is a formal document that lists a candidate's work experience, education and skills. A good resume gives a potential employer enough information to believe the applicant is worth interviewing. That's why it is so important to create a résumé that is effective. Take a look at the steps to create an effective resume:

Step 1: Write the Address Section

The Address section occupies the top of your resume. It includes information like your name, address, phone number and e-mail address. Insert a bold line under the section to separate it from rest of your resume.

Example:

Jasmine Watts
Breach Candy, Mumbai – India
Contact No: +91 2223678270
Email: jasmine.watts@gmail.com

Step 2: Add the Profile Summary Section

This part of your resume should list your overall experiences, achievements, awards, certifications and strengths. You can make your summary as short as 2-3 bullet points or as long as 8-10 bullet points.

Example:

Profile Summary

- A Content Writer graduated from University of Strathclyde having 6 years of experience in writing website copy.
- Core expertise lies in content creation for e-learning courses, specifically for the K-12 segment.

Step 3: Include Your Educational Qualifications

When listing your academic records, first list your highest degree. Then add the second highest qualification under the highest one and so on. To provide a clear and accurate picture of your educational background, it is critical that include information on your position, rank, percentage or CPI for every degree or certification that you have listed.

If you have done any certifications and trainings, you can add a Trainings & Certifications section under your Educational Qualifications section.

Example:

Educational Qualifications

- Masters in International Management (2007) from Columbia University with 8.8 CPI.
- Bachelor of Management Studies (2004) from Mumbai University with 87% marks.
- 10+2 with Math, Stats (2001) from Maharashtra Board with 91% marks.
- High School (1999) from Maharashtra Board with 93% marks.

Step 4: List Your Technical Skills

When listing your technical skills, start with the skills that you are most confident about. Then add the skills that you do not have as good a command over. It is perfectly acceptable to include just one skill, if you feel that particular skill adds tremendous value to your résumé. If you do not have any technical skills, you can omit this step.

Example:

Technical Skills

- Flash
- Photoshop

Step 5: Insert Your Academic Project Experience

List down all the important projects that you have worked on. Include the following information in this section:

- Project title
- Organization
- Platform used
- Contribution
- Description

Example:

Academic Projects

Project Title: Different Communication Skills

Organization: True Blue Solutions

Platform used: Articulate

Contribution: Content writing and graphic visualization

Description: Development of storyboards for corporate induction & training programs

Step 6: List Your Strengths

This is where you list all your major strengths. This section should be in the form of a bulleted list.

Example:

Strengths

- Excellent oral, written and presentation skills
- Action-oriented and result-focused
- Great time management skills

Step 7: List Your Extracurricular Activities

It is very important to show that you have diverse interests and that your life consists of more than academics. Including your extracurricular activities can give you an added edge over other candidates who have similar academic scores and project experiences. This section should be in the form of a bulleted list.

Example:

Extracurricular Activities

- Member of the Debate Club
- Played tennis at a national level
- Won first prize in the All India Camel Contest, 2010

Step 8: Write Your Personal Details

The last section of your résumé must include the following personal information:

- Date of birth
- Nationality
- Gender & marital status
- Languages known

Example:

Personal Details

- Date of birth: 25th May, 1981
- Gender & marital status: Female, Single
- Nationality: Indian
- Languages known: English, Hindi, Tamil, French

Tips

- Keep your resume file name short, simple and informational.
- Make sure the resume is neat and free from typing errors.
- Always create your resume on plain white paper.

6.4.3 Interview FAQs

Take a look at some of the most frequently asked interview questions, and some helpful tips on how to answer them.

Q1. Can you tell me a little about yourself?

Tips to answer:

- Don't provide your full employment or personal history.
- Offer 2-3 specific experiences that you feel are most valuable and relevant.
- Conclude with how those experiences have made you perfect for this specific role.

Q2. How did you hear about the position?

Tips to answer:

- Tell the interviewer how you heard about the job – whether it was through a friend (name the friend), event or article (name them) or a job portal (say which one).
- Explain what excites you about the position and what in particular caught your eye about this role.

Q3. What do you know about the company?

Tips to answer:

- Don't recite the company's About Us page.
- Show that you understand and care about the company's goals.
- Explain why you believe in the company's mission and values.

Q4. Why do you want this job?

Tips to answer:

- Show that you are passionate about the job.
- Identify why the role is a great fit for you.
- Explain why you love the company.

Q5. Why should we hire you?

Tips to answer:

- Prove through your words that you can not only do the work, but can definitely deliver excellent results.
- Explain why you would be a great fit with the team and work culture.
- Explain why you should be chosen over any other candidate.

Q6. What are your greatest professional strengths?

Tips to answer:

- Be honest – share some of your real strengths, rather than give answers that you think sound good.
- Offer examples of specific strengths that are relevant to the position you are applying for.
- Provide examples of how you've demonstrated these strengths.

Q7. What do you consider to be your weaknesses?

Tips to answer:

- The purpose of this question is to gauge your self-awareness and honesty.
- Give an example of a trait that you struggle with, but that you're working on to improve.

Q8. What are your salary requirements?

Tips to answer:

- Do your research beforehand and find out the typical salary range for the job you are applying for.
- Figure out where you lie on the pay scale based on your experience, education, and skills.
- Be flexible. Tell the interviewer that you know your skills are valuable, but that you want the job and are willing to negotiate.

Q9. What do you like to do outside of work?

Tips to answer:

- The purpose of this question is to see if you will fit in with the company culture.
- Be honest – open up and share activities and hobbies that interest and excite you.

Q10. If you were an animal, which one would you want to be?

Tips to answer:

- The purpose of this question is to see if you are able to think on your feet.
- There's no wrong answer – but to make a great impression try to bring out your strengths or personality traits through your answer.

Q11: What do you think we could do better or differently?

Tips to answer:

- The purpose of this question is to see if you have done your research on the company, and to test whether you can think critically and come up with new ideas.
- Suggest new ideas. Show how your interests and expertise would help you execute these ideas.

Q12: Do you have any questions for us?

Tips to answer:

- Do not ask questions to which the answers can be easily found on the company website or through a quick online search.
- Ask intelligent questions that show your ability to think critically.

Tips

- Be honest and confident while answering.
- Use examples of your past experiences wherever possible to make your answers more impactful.

6.4.4 Work Readiness – Terms & Terminologies: Basic Workplace Terminology

Every employee should be well versed in the following terms:

- **Annual leave:** Paid vacation leave given by employers to employees.
- **Background Check:** A method used by employers to verify the accuracy of the information provided by potential candidates.
- **Benefits:** A part of an employee's compensation package.
- **Breaks:** Short periods of rest taken by employees during working hours.
- **Compensation Package:** The combination of salary and benefits that an employer provides to his/her employees.
- **Compensatory Time (Comp Time):** Time off in lieu of pay.
- **Contract Employee:** An employee who works for one organization that sells said employee's services to another company, either on a project or time basis.
- **Contract of Employment:** When an employee is offered work in exchange for wages or salary, and accepts the offer made by the employer, a contract of employment exists.
- **Corporate Culture:** The beliefs and values shared by all the members of a company, and imparted from one generation of employees to another.
- **Counter Offer/Counter Proposal:** A negotiation technique used by potential candidates to increase the amount of salary offered by a company.
- **Cover Letter:** A letter that accompanies a candidate's resume. It emphasizes the important points in the candidate's resume and provides real examples that prove the candidate's ability to perform the expected job role.
- **Curriculum Vitae (CV)/Resume:** A summary of a candidate's achievements, educational background, work experience, skills and strengths.
- **Declining Letter:** A letter sent by an employee to an employer, turning down the job offer made by the employer to the employee.
- **Deductions:** Amounts subtracted from an employee's pay and listed on the employee's pay slip.
- **Discrimination:** The act of treating one person not as favourably as another person.
- **Employee:** A person who works for another person in exchange for payment.
- **Employee Training:** A workshop or in-house training that an employee is asked to attend by his or her superior, for the benefit of the employer.
- **Employment Gaps:** Periods of unemployed time between jobs.
- **Fixed-Term Contract:** A contract of employment which gets terminated on an agreed-upon date.
- **Follow-Up:** The act of contacting a potential employer after a candidate has submitted his or her resume.
- **Freelancer/Consultant/Independent Contractor:** A person who works for him or herself and pitches for temporary jobs and projects with different employers.
- **Holiday**: Paid time-off from work.
- **Hourly Rate**: The amount of salary or wages paid for 60 minutes of work.

- **Internship**: A job opportunity offered by an employer to a potential employee, called an intern, to work at the employer's company for a fixed, limited time period.
- **Interview**: A conversation between a potential employee and a representative of an employer, in order to determine if the potential employee should be hired.
- **Job Application**: A form which asks for a candidate's information like the candidate's name, address, contact details and work experience. The purpose of a candidate submitting a job application, is to show that candidate's interest in working for a particular company.
- **Job Offer**: An offer of employment made by an employer to a potential employee.
- **Job Search Agent**: A program that enables candidates to search for employment opportunities by selecting criteria listed in the program, for job vacancies.
- **Lay Off**: A lay off occurs when an employee is temporarily let go from his or her job, due to the employer not having any work for that employee.
- **Leave**: Formal permission given to an employee, by his or her employer, to take a leave of absence from work.
- **Letter of Acceptance**: A letter given by an employer to an employee, confirming the offer of employment made by the employer, as well as the conditions of the offer.
- **Letter of Agreement**: A letter that outlines the terms of employment.
- **Letter of Recommendation**: A letter written for the purpose of validating the work skills of a person.
- **Maternity Leave**: Leave taken from work by women who are pregnant, or who have just given birth.
- **Mentor**: A person who is employed at a higher level than you, who offers you advice and guides you in your career.
- **Minimum wage**: The minimum wage amount paid on an hourly basis.
- **Notice**: An announcement made by an employee or an employer, stating that the employment contract will end on a particular date.
- **Offer of Employment**: An offer made by an employer to a prospective employee that contains important information pertaining to the job being offered, like the starting date, salary, working conditions etc.
- **Open-Ended Contract**: A contract of employment that continues till the employer or employee terminates it.
- **Overqualified**: A person who is not suited for a particular job because he or she has too many years of work experience, or a level of education that is much higher than required for the job, or is currently or was previously too highly paid.
- **Part-Time Worker**: An employee who works for fewer hours than the standard number of hours normally worked.
- **Paternity Leave**: Leave granted to a man who has recently become a father.
- **Recruiters/Headhunters/Executive Search Firms**: Professionals who are paid by employers to search for people to fill particular positions.
- **Resigning/Resignations**: When an employee formally informs his or her employer that he or she is quitting his or her job.
- **Self-Employed**: A person who has his or her own business and does not work in the capacity of an employee.
- **Time Sheet**: A form that is submitted to an employer, by an employee, that contains the number of hours worked every day by the employee.

6.5. Understanding Entrepreneurship

Unit Objectives

1. At the end of this unit, you will be able to:
2. Discuss the concept of entrepreneurship
3. Discuss the importance of entrepreneurship
4. Describe the characteristics of an entrepreneur
5. Describe the different types of enterprises
6. List the qualities of an effective leader
7. Discuss the benefits of effective leadership
8. List the traits of an effective team
9. Discuss the importance of listening effectively
10. Discuss how to listen effectively
11. Discuss the importance of speaking effectively
12. Discuss how to speak effectively
13. Discuss how to solve problems
14. List important problem solving traits
15. Discuss ways to assess problem solving skills
16. Discuss the importance of negotiation
17. Discuss how to negotiate
18. Discuss how to identify new business opportunities
19. Discuss how to identify business opportunities within your business
20. Understand the meaning of entrepreneur
21. Describe the different types of entrepreneurs
22. List the characteristics of entrepreneurs
23. Recall entrepreneur success stories
24. Discuss the entrepreneurial process
25. Describe the entrepreneurship ecosystem
26. Discuss the government's role in the entrepreneurship ecosystem
27. Discuss the current entrepreneurship ecosystem in India
28. Understand the purpose of the Make in India campaign
29. Discuss the relationship between entrepreneurship and risk appetite
30. Discuss the relationship between entrepreneurship and resilience
31. Describe the characteristics of a resilient entrepreneur
32. Discuss how to deal with failure

6.5.1 Concept Introduction, (Characteris tic of an Entrepreneur, types of firms / types of enterprises): Entrepreneurs and Entrepreneurship

Anyone who is determined to start a business, no matter what the risk, is an entrepreneur. Entrepreneurs run their own start-up, take responsibility for the financial risks and use creativity, innovation and vast reserves of self-motivation to achieve success. They dream big and are determined to do whatever it takes to turn their idea into a viable offering. The aim of an entrepreneur is to create an enterprise. The process of creating this enterprise is known as entrepreneurship.

Importance of Entrepreneurship

Entrepreneurship is very important for the following reasons:

1. It results in the creation of new organizations
2. It brings creativity into the marketplace
3. It leads to improved standards of living
4. It helps develop the economy of a country

Characteristics of Entrepreneurs

All successful entrepreneurs have certain characteristics in common.

They are all:

- Extremely passionate about their work
- Confident in themselves
- Disciplined and dedicated
- Motivated and driven
- Highly creative
- Visionaries
- Open-minded
- Decisive

Entrepreneurs also have a tendency to:

- Have a high risk tolerance
- Thoroughly plan everything
- Manage their money wisely
- Make their customers their priority
- Understand their offering and their market in detail
- Ask for advice from experts when required
- Know when to cut their losses

Examples of Famous Entrepreneurs

Some famous entrepreneurs are:

- Bill Gates (Founder of Microsoft)
- Steve Jobs (Co-founder of Apple)
- Mark Zuckerberg (Founder of Facebook)
- Pierre Omidyar (Founder of eBay)

Types of Enterprises

As an entrepreneur in India, you can own and run any of the following types of enterprises:

Sole Proprietorship

In a sole proprietorship, a single individual owns, manages and controls the enterprise. This type of business is the easiest to form with respect to legal formalities. The business and the owner have no separate legal existence. All profit belongs to the proprietor, as do all the losses - the liability of the entrepreneur is unlimited.

Partnership

A partnership firm is formed by two or more people. The owners of the enterprise are called partners. A partnership deed must be signed by all the partners. The firm and its partners have no separate legal existence. The profits are shared by the partners. With respect to losses, the liability of the partners is unlimited. A firm has a limited life span and must be dissolved when any one of the partners dies, retires, claims bankruptcy or goes insane.

Limited Liability Partnership (LLP)

In a Limited Liability Partnership or LLP, the partners of the firm enjoy perpetual existence as well as the advantage of limited liability. Each partner's liability is limited to their agreed contribution to the LLP. The partnership and its partners have a separate legal existence.

Tips

- Learn from others' failures.
- Be certain that this is what you want.
- Search for a problem to solve, rather than look for a problem to attach to your idea.

6.5.2 Leadership & Teamwork:

Leadership and Leaders

Leadership means setting an example for others to follow. Setting a good example means not asking someone to do something that you wouldn't willingly want to do yourself. Leadership is about figuring out what to do in order to win as a team, and as a company.

Leaders believe in doing the right things. They also believe in helping others to do the right things. An effective leader is someone who:

- Creates an inspiring vision of the future.
- Motivates and inspires his team to pursue that vision.

Leadership Qualities That All Entrepreneurs Need

Building a successful enterprise is only possible if the entrepreneur in charge possesses excellent leadership qualities. Some critical leadership skills that every entrepreneur must have are:

1. **Pragmatism**: This means having the ability to highlight all obstacles and challenges, in order to resolve issues and reduce risks.
2. **Humility**: This means admitting to mistakes often and early, and being quick to take responsibility for your actions. Mistakes should be viewed as challenges to overcome, not opportunities to point blame.
3. **Flexibility**: It is critical for a good leader to be very flexible and quickly adapt to change. It is equally critical to know when to adapt and when not to.
4. **Authenticity**: This means showing both, your strengths and your weaknesses. It means being human and showing others that you are human.
5. **Reinvention**: This means refreshing or changing your leadership style when necessary. To do this, it's important to learn where your leadership gaps lie and find out what resources are required to close them.
6. **Awareness**: This means taking the time to recognize how others view you. It means understanding how your presence affects those around you.

Benefits of Effective Leadership

Effective leadership results in numerous benefits. Great leadership leads to the leader successfully:

- Gaining the loyalty and commitment of the team members
- Motivating the team to work towards achieving the company's goals and objectives
- Building morale and instilling confidence in the team members
- Fostering mutual understanding and team-spirit among team members
- Convincing team members about the need to change when a situation requires adaptability

Teamwork and Teams

Teamwork occurs when the people in a workplace combine their individual skills to pursue a common goal. Effective teams are made up of individuals who work together to achieve this common goal. A great team is one who holds themselves accountable for the end result.

Importance of Teamwork in Entrepreneurial Success

For an entrepreneurial leader, building an effective team is critical to the success of a venture. An entrepreneur must ensure that the team he builds possesses certain crucial qualities, traits and characteristics. An effective team is one which has:

1. **Unity of purpose:** All the team members should clearly understand and be equally committed to the purpose, vision and goals of the team.
2. **Great communication skills:** Team members should have the ability to express their concerns, ask questions and use diagrams, and charts to convey complex information.
3. **The ability to collaborate:** Every member should feel entitled to provide regular feedback on new ideas.
4. **Initiative:** The team should consist of proactive individuals. The members should have the enthusiasm to come up with new ideas, improve existing ideas, and conduct their own research.
5. **Visionary members:** The team should have the ability to anticipate problems and act on these potential problem before they turn into real problems.
6. **Great adaptability skills:** The team must believe that change is a positive force. Change should be seen as the chance to improve and try new things.
7. **Excellent organizational skills:** The team should have the ability to develop standard work processes, balance responsibilities, properly plan projects, and set in place methods to measure progress and ROI.

Tips

- Don't get too attached to your original idea. Allow it to evolve and change.
- Be aware of your weaknesses and build a team that will complement your shortfalls.
- Hiring the right people is not enough. You need to promote or incentivize your most talented people to keep them motivated.
- Earn your team's respect.

6.5.3 Communication Skills: Listening & Speaking: The Importance of Listening Effectively

Listening is the ability to correctly receive and understand messages during the process of communication. Listening is critical for effective communication. Without effective listening skills, messages can easily be misunderstood. This results in a communication breakdown and can lead to the sender and the receiver of the message becoming frustrated or irritated.

It's very important to note that listening is not the same as hearing. Hearing just refers to sounds that you hear. Listening is a whole lot more than that. To listen, one requires focus. It means not only paying attention to the story, but also focusing on how the story is relayed, the way language and voice is used, and even how the speaker uses their body language. The ability to listen depends on how effectively one can perceive and understand both, verbal and non-verbal cues.

How to Listen Effectively

To listen effectively you should:

- Stop talking
- Stop interrupting
- Focus completely on what is being said
- Nod and use encouraging words and gestures
- Be open-minded
- Think about the speaker's perspective
- Be very, very patient
- Pay attention to the tone that is being used
- Pay attention to the speaker's gestures, facial expressions and eye movements
- Not try and rush the person
- Not let the speaker's mannerisms or habits irritate or distract you

How to Listen Effectively

How successfully a message gets conveyed depends entirely on how effectively you are able to get it through. An effective speaker is one who enunciates properly, pronounces words correctly, chooses the right words and speaks at a pace that is easily understandable. Besides this, the words spoken out loud need to match the gestures, tone and body language used.

What you say, and the tone in which you say it, results in numerous perceptions being formed. A person who speaks hesitantly may be perceived as having low self-esteem or lacking in knowledge of the discussed topic. Those with a quiet voice may very well be labelled as shy. And those who speak in commanding tones with high levels of clarity, are usually considered to be extremely confident. This makes speaking a very critical communication skill.

How to Speak Effectively

To speak effectively you should:

- Incorporate body language in your speech like eye contact, smiling, nodding, gesturing etc.
- Build a draft of your speech before actually making your speech.
- Ensure that all your emotions and feelings are under control.
- Pronounce your words distinctly with the correct pitch and intensity. Your speech should be crystal clear at all times.
- Use a pleasant and natural tone when speaking. Your audience should not feel like you are putting on an accent or being unnatural in any way.
- Use precise and specific words to drive your message home. Ambiguity should be avoided at all costs.
- Ensure that your speech has a logical flow.
- Be brief. Don't add any unnecessary information.
- Make a conscious effort to avoid irritating mannerisms like fidgeting, twitching etc.
- Choose your words carefully and use simple words that the majority of the audience will have no difficulty understanding.
- Use visual aids like slides or a whiteboard.
- Speak slowly so that your audience can easily understand what you're saying. However, be careful not to speak too slowly because this can come across as stiff, unprepared or even condescending.
- Remember to pause at the right moments.

Tips

- If you're finding it difficult to focus on what someone is saying, try repeating their words in your head.
- Always maintain eye contact with the person that you are communicating with, when speaking as well as listening. This conveys and also encourages interest in the conversation.

6.5.4 Problem Solving & Negotiation skills:

What is a Problem?

As per The Concise Oxford Dictionary (1995), a problem is, "A doubtful or difficult matter requiring a solution"

All problems contain two elements:

1. Goals 2. Obstacles

The aim of problem solving is to recognize the obstacles and remove them in order to achieve the goals.

How to Solve Problems

Solving a problem requires a level of rational thinking. Here are some logical steps to follow when faced with an issue:

Step 1: Identify the problem

Step 2: Study the problem in detail

Step 3: List all possible solutions

Step 4: Select the best solution

Step 5: Implement the chosen solution

Step 6: Check that the problem has really been solved

Important Traits for Problem Solving

Highly developed problem solving skills are critical for both, business owners and their employees. The following personality traits play a big role in how effectively problems are solved:

- Being open minded
- Being proactive
- Having a positive attitude
- Asking the right questions
- Not panicking
- Focusing on the right problem

How to Assess for Problem Solving Skills

As an entrepreneur, it would be a good idea to assess the level of problem solving skills of potential candidates before hiring them. Some ways to assess this skill are through:

1. **Application forms**: Ask for proof of the candidate's problem solving skills in the application form.
2. **Psychometric tests**: Give potential candidates logical reasoning and critical thinking tests and see how they fare.
3. **Interviews**: Create hypothetical problematic situations or raise ethical questions and see how the candidates respond.
4. **Technical questions**: Give candidates examples of real life problems and evaluate their thought process.

What is Negotiation?

Negotiation is a method used to settle differences. The aim of negotiation is to resolve differences through a compromise or agreement while avoiding disputes. Without negotiation, conflicts are likely to lead to resentment between people. Good negotiation skills help satisfy both parties and go a long way towards developing strong relationships.

Why Negotiate

Starting a business requires many, many negotiations. Some negotiations are small while others are critical enough to make or break a startup. Negotiation also plays a big role inside the workplace. As an entrepreneur, you need to know not only know how to negotiate yourself, but also how to train employees in the art of negotiation.

How to Negotiate

Take a look at some steps to help you negotiate:

Step 1: Pre-Negotiation Preparation	Agree on where to meet to discuss the problem, decide who all will be present and set a time limit for the discussion.
Step 2: Discuss the Problem	This involves asking questions, listening to the other side, putting your views forward and clarifying doubts.
Step 3: Clarify the Objective	Ensure that both parties want to solve the same problem and reach the same goal.
Step 4: Aim for a Win-Win Outcome	Try your best to be open minded when negotiating. Compromise and offer alternate solutions to reach an outcome where both parties win.
Step 5: Clearly Define the Agreement	When an agreement has been reached, the details of the agreement should be crystal clear to both sides, with no scope for misunderstandings.
Step 6: Implement the Agreed Upon Solution	Agree on a course of action to set the solution in motion

Tips

- Know exactly what you want before you work towards getting it
- Give more importance to listening and thinking, than speaking
- Focus on building a relationship rather than winning
- Remember that your people skills will affect the outcome
- Know when to walk away – sometimes reaching an agreement may not be possible

6.5.5 Business Opportunities Identification: Entrepreneurs and Opportunities

"The entrepreneur always searches for change, responds to it and exploits it as an opportunity."

Peter Drucker

The ability to identify business opportunities is an essential characteristic of an entrepreneur.

What is an Opportunity?

The word opportunity suggests a good chance or a favourable situation to do something offered by circumstances.

A business opportunity means a good or favourable change available to run a specific business in a given environment, at a given point of time.

Common Questions Faced by Entrepreneurs

A critical question that all entrepreneurs face is how to go about finding the business opportunity that is right for them.

Some common questions that entrepreneurs constantly think about are:

- Should the new enterprise introduce a new product or service based on an unmet need?
- Should the new enterprise select an existing product or service from one market and offer it in another where it may not be available?
- Should the enterprise be based on a tried and tested formula that has worked elsewhere?

It is therefore extremely important that entrepreneurs must learn how to identify new and existing business opportunities and evaluate their chances of success.

When is an Idea an Opportunity?

An idea is an opportunity when:

- It creates or adds value to a customer
- It solves a significant problem, removes a pain point or meets a demand
- Has a robust market and profit margin
- Is a good fit with the founder and management team at the right time and place

Factors to Consider When Looking for Opportunities

Consider the following when looking for business opportunities:

- Economic trends
- Changes in funding
- Changing relationships between vendors, partners and suppliers
- Market trends
- Changes in political support
- Shift in target audience

Ways to Identify New Business Opportunities

1. Identify Market Inefficiencies

   When looking at a market, consider what inefficiencies are present in the market. Think about ways to correct these inefficiencies.

2. Remove Key Hassles

   Rather than create a new product or service, you can innovatively improve a product, service or process.

3. Create Something New

   Think about how you can create a new experience for customers, based on existing business models.

4. Pick a Growing Sector/Industry

   Research and find out which sectors or industries are growing and think about what opportunities you can tap in the same.

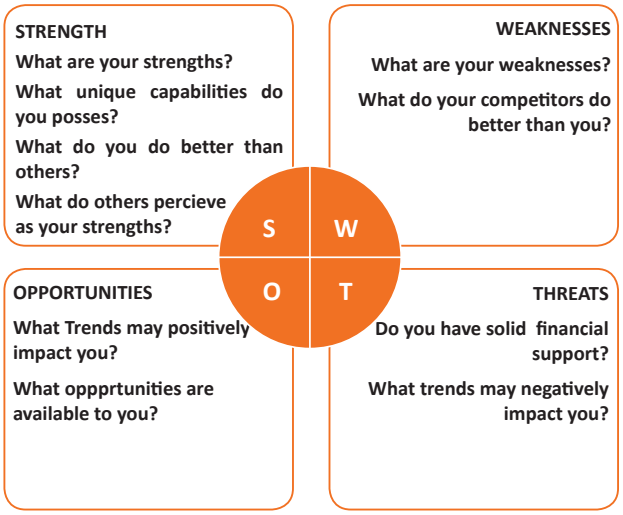
5. Think About Product Differentiation

   If you already have a product in mind, think about ways to set it apart from the existing ones.

Ways to Identify Business Opportunities Within Your Business

1. SWOT Analysis

   An excellent way to identify opportunities inside your business is by creating a SWOT analysis. The acronym SWOT stands for strengths, weaknesses, opportunities, and threats. SWOT analysis framework:



Consider the following when looking for business opportunities:

By looking at yourself and your competitors using the SWOT framework, you can uncover opportunities that you can exploit, as well as manage and eliminate threats that could derail your success.

2. Establishing Your USP

Establish your USP and position yourself as different from your competitors. Identify why customers should buy from you and promote that reason.

Opportunity Analysis

Once you have identified an opportunity, you need to analyze it.
To analyze an opportunity, you must:

- Focus on the idea
- Focus on the market of the idea
- Talk to industry leaders in the same space as the idea
- Talk to players in the same space as the idea

Tips

- Remember, opportunities are situational.
- Look for a proven track record.
- Avoid the latest craze.
- Love your idea.

6.5.6 Entrepreneurship Support Eco - System: What is an Entrepreneur?

An entrepreneur is a person who:

- Does not work for an employee
- Runs a small enterprise
- Assumes all the risks and rewards of the enterprise, idea, good or service

Types of Entrepreneurs

There are four main types of entrepreneurs:

1. **The Traditional Entrepreneur**: This type of entrepreneur usually has some kind of skill – they can be a carpenter, mechanic, cook etc. They have businesses that have been around for numerous years like restaurants, shops and carpenters. Typically, they gain plenty of experience in a particular industry before they begin their own business in a similar field.
2. **The Growth Potential Entrepreneur**: The desire of this type of entrepreneur is to start an enterprise that will grow, win many customers and make lots of money. Their ultimate aim is to eventually sell their enterprise for a nice profit. Such entrepreneurs usually have a science or technical background.
3. **The Project-Oriented Entrepreneur**: This type of entrepreneur generally has a background in the Arts or psychology. Their enterprises tend to be focus on something that they are very passionate about.
4. **The Lifestyle Entrepreneur**: This type of entrepreneur has usually worked as a teacher or a secretary. They are more interested in selling something that people will enjoy, rather than making lots of money.

Characteristics of an Entrepreneur

Successful entrepreneurs have the following characteristics:

- They are highly motivated
- They are creative and persuasive
- They are mentally prepared to handle each and every task
- They have excellent business skills – they know how to evaluate their cash flow, sales and revenue
- They are willing to take great risks
- They are very proactive – this means they are willing to do the work themselves, rather than wait for someone else to do it
- They have a vision – they are able to see the big picture
- They are flexible and open-minded
- They are good at making decisions

Entrepreneur Success Stories

Dhiru Bhai Ambani

Dhirubhai Ambani began his entrepreneurial career by selling "bhajias" to pilgrims in Mount Girnar on weekends. At 16, he moved to Yemen where he worked as a gas-station attendant, and as a clerk in an oil company. He returned to India with Rs. 50,000 and started a textile trading company. Reliance went on to become the first Indian company to raise money in global markets and the first Indian company to feature in Forbes 500 list.

Dr. Karsanbhai Patel

Karsanbhai Patel made detergent powder in the backyard of his house. He sold his product door-to-door and offered a money back guarantee with every pack that was sold. He charged Rs. 3 per kg when the cheapest detergent at that time was Rs.13 per kg. Dr. Patel eventually started Nirma which became a whole new segment in the Indian domestic detergent market.

The Entrepreneurial Process

Let's take a look at the stages of the entrepreneurial process.

Stage 1: Idea Generation. The entrepreneurial process begins with an idea that has been thought of by the entrepreneur. The idea is a problem that has the potential to be solved.

Stage 2: Germination or Recognition. In this stage a possible solution to the identified problem is thought of.

Stage 3: Preparation or Rationalization. The problem is studied further and research is done to find out how others have tried to solve the same problem.

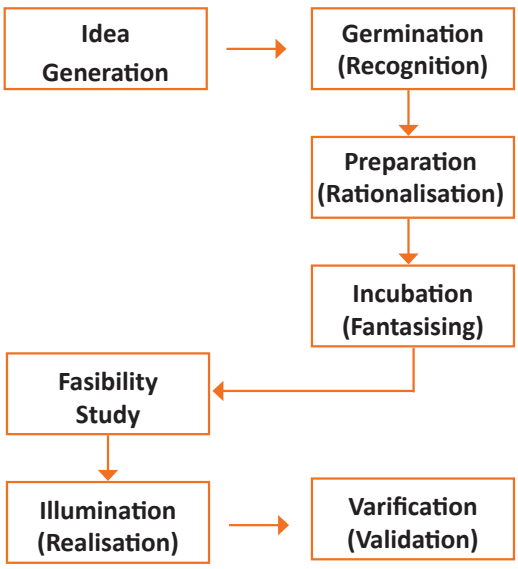
Stage 4: Incubation or Fantasizing. This stage involves creative thinking for the purpose of coming up with more ideas. Less thought is given to the problem areas.

Stage 5: Feasibility Study: The next step is the creation of a feasibility study to determine if the idea will make a profit and if it should be seen through.

Stage 6: Illumination or Realization. This is when all uncertain areas suddenly become clear. The entrepreneur feels confident that his idea has merit.

Stage 7: Verification or Validation. In this final stage, the idea is verified to see if it works and if it is useful.

Take a look at the diagram below to get a better idea of this process.



What is an Entrepreneur?

The entrepreneurship support ecosystem signifies the collective and complete nature of entrepreneurship. New companies emerge and flourish not only because of the courageous, visionary entrepreneurs who launch them, but they thrive as they are set in an environment or 'ecosystem' made of private and public participants. These players nurture and sustain the new ventures, facilitating the entrepreneurs' efforts.

An entrepreneurship ecosystem comprises of the following six domains:

1. **Favourable Culture:** This includes elements such as tolerance of risk and errors, valuable networking and positive social standing of the entrepreneur.
2. **Facilitating Policies & Leadership:** This includes regulatory framework incentives and existence of public research institutes.
3. **Financing Options:** Angel financing, venture capitalists and micro loans would be good examples of this.
4. **Human Capital:** This refers to trained and untrained labour, entrepreneurs and entrepreneurship training programmes, etc.
5. **Conducive Markets for Products & Services:** This refers to an existence or scope of existence of a market for the product/service.
6. **Institutional & Infrastructural Support:** This includes legal and financing advisers, telecommunications, digital and transportation infrastructure, and entrepreneurship networking programmes.

These domains indicate whether there is a strong entrepreneurship support ecosystem and what actions should the government put in place to further encourage this ecosystem. The six domains and their various elements have been graphically depicted.

Early Customers

- Early adopters for proof-of-concept
- Expertise in productizing
- Reference customer
- First reviews
- Distribution channels

Leadership

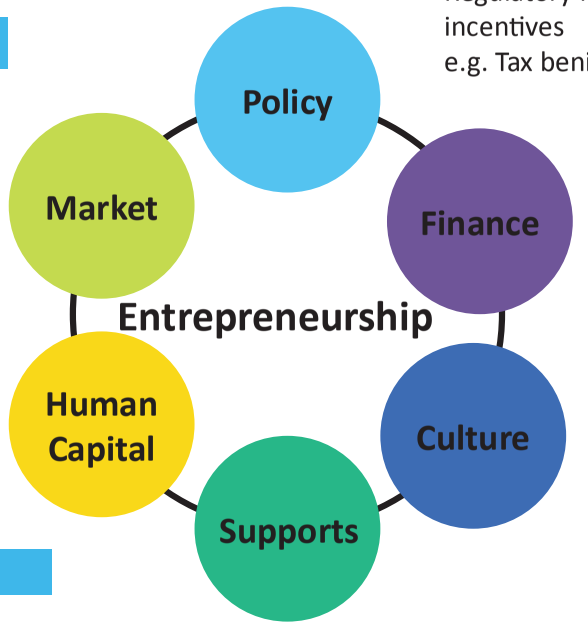
- Unequivocal support
- Social legitimacy
- Open door for advocate
- Entrepreneurship strategy
- urgency, crisis and challenge

Government

- Institutions
  e.g. Investment, support
- Financial support
  e.g. for R&D, jump start funds
  Regulatory framework
  incentives
  e.g. Tax benifits
- Research institutes
- Venture-friendly
  legislation
- e.g. Bankruptcy,
  contract enforcement, property rights, and labour

Networks

- Entrepreneure's networks
- Diaspora networks
- Multinational corporations



Financial Capital

- Micro-loans
- Angel investors, friends and family
- Zero-stage venture capital
- Venture capital funds
- Private equity
- Public capital markets
- Debt

Labour

- Skilled and unskilled
- Serial entrepreneures
- Later generation family

Success Stories

- Visible successes
- Wealth generation for founders
- International reputation

Educational Institutions

- General degrees (professional and academic)
- Specific entrepreneurship training

Societal norms

- Tolerance of risk, mistakes, failure
- Innovation, creativity, experimentation
- Social status of entrepreneur
- Wealth creation
- Ambition, drive, hunger

Infrastructure

- Telecommunications
- Transportation & logistics
- Energy
- Zones, incubation centers, clusters

Non-Government Institution

- Entrepreneurship promotion in non-profits
- Business plan contests
- Conferences
- Entrepreneur- friendly association

Support Professions

- Legal
- Accounting
- Investment bankers

Every entrepreneurship support ecosystem is unique and all the elements of the ecosystem are interdependent. Although every region's entrepreneurship ecosystem can be broadly described by the above features, each ecosystem is the result of the hundred elements interacting in highly complex and particular ways.

Entrepreneurship ecosystems eventually become (largely) self-sustaining. When the six domains are resilient enough, they are mutually beneficial. At this point, government involvement can and should be significantly minimized. Public leaders do not need to invest a lot to sustain the ecosystem. It is imperative that the entrepreneurship ecosystem incentives are formulated to be self-liquidating, hence focusing on sustainability of the environment.

Government's Role in the Entrepreneurship Ecosystem

Encouraging new ventures is a major focus for policymakers. Governments across the world are recognizing that new businesses flourish in distinctive types of supportive environments. Policymakers should study the scenario and take into account the following points whilst they formulate policies and regulations that enable successful entrepreneurship support ecosystems.

1. Policymakers should avoid regulations that discourage new entrants and work towards building efficient methods for business startups. Policies and regulations that favour existing, dominant firms over entrepreneurial ventures, restrict competition and obstruct entry for new companies.
2. Instead of developing policies conceptually intended to correct market failures, policymakers should interact with entrepreneurs and understand the challenges faced by them. The feedback should be used to develop policies that incite idea exploration, product development and increased rates of deal flow.
3. Entrepreneurial supporters should create a database that enables identifying who the participants in the ecosystem are and how they are connected. These ecosystem maps are useful tools in developing engagement strategies.
4. Disruptions are unavoidable in economic and social life. However, it's important to note that economic disruption gives rise to entrepreneurial opportunities. Architects of the entrepreneurship ecosystems (entrepreneurs, mentors, policymakers and consumers,) should anticipate these dips, thus capitalizing on the opportunities they create.

The need for effective strategies to enable local entrepreneurship support ecosystems is a practical one. Better understanding of the actual ecosystems provides a framework within which policy makers can ask relevant questions, envisage more efficient approaches, and assess ensuing outcomes.

Snapshot of the Entrepreneurship Ecosystem in India

Entrepreneurship has earned a newfound respect in India. Many Indians, with exposure to the world of business, who traditionally would have opted for a job, are setting up their own ventures. Many elements of the entrepreneurship ecosystem are beginning to come together. For example, increase in venture capitalists, government schemes and incubators, academia industry linkages, and emerging clusters and support to rural economy. All these initiatives are effective but there is a need to scale up and enrich the ecosystem further in the following ways:

1. We need to review our attitude towards failures and accept them as learning experiences.
2. We must encourage the educated to become entrepreneurs and provide students in schools and colleges with entrepreneurship skills.

3. Universities, research labs and the government need to play the role of enablers in the entrepreneurship support ecosystem.
4. Policymakers need to focus on reducing the obstacles such as corruption, red tape and bureaucracy.
5. We need to improve our legal systems and court international venture capital firms and bring them to India.
6. We must devise policies and methods to reach the secondary and tertiary towns in India, where people do not have access to the same resources available in the cities.

Today, there is a huge opportunity in this country to introduce innovative solutions that are capable of scaling up, and collaborating within the ecosystem as well as enriching it.

Make in India Campaign

Every entrepreneur has certain needs. Some of their important needs are:

- To easily get loans
- To easily find investors
- To get tax exemptions
- To easily access resources and good infrastructure
- To enjoy a procedure that is free of hassles and is quick
- To be able to easily partner with other firms

The Make in India campaign, launched by Prime Minister Modi aims to satisfy all these needs of young, aspiring entrepreneurs. Its objective is to:

- Make investment easy
- Support new ideas
- Enhance skill development
- Safeguard the ideas of entrepreneurs
- Create state-of-the-art facilities for manufacturing goods

Tips

- Research the existing market, network with other entrepreneurs, venture capitalists, angel investors, and thoroughly review the policies in place to enable your entrepreneurship.
- Failure is a stepping stone and not the end of the road. Review yours and your peers' errors and correct them in your future venture.
- Be proactive in your ecosystem. Identify the key features of your ecosystem and enrich them to ensure self-sustainability of your entrepreneurship support ecosystem.

6.5.7 Risk Appetite & Resilience: Entrepreneurship and Risk

Entrepreneurs are inherently risk takers. They are path-makers not path-takers. Unlike a normal, cautious person, an entrepreneur would not think twice about quitting his job (his sole income) and taking a risk on himself and his idea.

An entrepreneur is aware that while pursuing his dreams, assumptions can be proven wrong and unforeseen events may arise. He knows that after dealing with numerous problems, success is still not guaranteed. Entrepreneurship is synonymous with the ability to take risks. This ability, called risk-appetite, is an entrepreneurial trait that is partly genetic and partly acquired.

What is Risk Appetite?

Risk appetite is defined as the extent to which a company is equipped to take risk, in order to achieve its objectives. Essentially, it refers to the balance, struck by the company, between possible profits and the hazards caused by changes in the environment (economic ecosystem, policies, etc.). Taking on more risk may lead to higher rewards but have a high probability of losses as well. However, being too conservative may go against the company as it can miss out on good opportunities to grow and reach their objectives.

The levels of risk appetite can be broadly categorized as “low”, “medium” and “high.” The company’s entrepreneur(s) have to evaluate all potential alternatives and select the option most likely to succeed. Companies have varying levels of risk appetites for different objectives. The levels depend on:

- The type of industry
- Market pressures
- Company objectives

For example, a startup with a revolutionary concept will have a very high risk appetite. The startup can afford short term failures before it achieves longer term success. This type of appetite will not remain constant and will be adjusted to account for the present circumstances of the company.

Risk Appetite Statement

Companies have to define and articulate their risk appetite in sync with decisions made about their objectives and opportunities. The point of having a risk appetite statement is to have a framework that clearly states the acceptance and management of risk in business. It sets risk taking limits within the company. The risk appetite statement should convey the following:

- The nature of risks the business faces.
- Which risks the company is comfortable taking on and which risks are unacceptable.
- How much risk to accept in all the risk categories.
- The desired tradeoff between risk and reward.
- Measures of risk and methods of examining and regulating risk exposures.

Entrepreneurship and Resilience

Entrepreneurs are characterized by a set of qualities known as resilience. These qualities play an especially large role in the early stages of developing an enterprise. Risk resilience is an extremely valuable characteristic as it is believed to protect entrepreneurs against the threat of challenges and changes in the business environment.

What is Entrepreneurial Resilience?

Resilience is used to describe individuals who have the ability to overcome setbacks related to their life and career aspirations. A resilient person is someone who is capable of easily and quickly recovering from setbacks. For the entrepreneur, resilience is a critical trait. Entrepreneurial resilience can be enhanced in the following ways:

- By developing a professional network of coaches and mentors
- By accepting that change is a part of life
- By viewing obstacles as something that can be overcome

Characteristics of a Resilient Entrepreneur

The characteristics required to make an entrepreneur resilient enough to go the whole way in their business enterprise are:

- A strong internal sense of control
- Strong social connections
- Skill to learn from setbacks
- Ability to look at the bigger picture
- Ability to diversify and expand
- Survivor attitude
- Cash-flow conscious habits
- Attention to detail

Tips

- Cultivate a great network of clients, suppliers, peers, friends and family. This will not only help you promote your business, but will also help you learn, identify new opportunities and stay tuned to changes in the market.
- Don’t dwell on setbacks. Focus on what the you need to do next to get moving again.
- While you should try and curtail expenses, ensure that it is not at the cost of your growth.

6.5.8 Success & Failures: Understanding Successes and Failures in Entrepreneurship

Shyam is a famous entrepreneur, known for his success story. But what most people don't know, is that Shyam failed numerous times before his enterprise became a success. Read his interview to get an idea of what entrepreneurship is really about, straight from an entrepreneur who has both, failed and succeeded.

Interviewer: Shyam, I have heard that entrepreneurs are great risk-takers who are never afraid of failing. Is this true?

Shyam: Ha ha, no of course it's not true! Most people believe that entrepreneurs need to be fearlessly enthusiastic. But the truth is, fear is a very normal and valid human reaction, especially when you are planning to start your own business! In fact, my biggest fear was the fear of failing. The reality is, entrepreneurs fail as much as they succeed. The trick is to not allow the fear of failing to stop you from going ahead with your plans. Remember, failures are lessons for future success!

Interviewer: What, according to you, is the reason that entrepreneurs fail?

Shyam: Well, there is no one single reason why entrepreneurs fail. An entrepreneur can fail due to numerous reasons. You could fail because you have allowed your fear of failure to defeat you. You could fail because you are unwilling to delegate (distribute) work. As the saying goes, "You can do anything, but not everything!" You could fail because you gave up too easily – maybe you were not persistent enough. You could fail because you were focusing your energy on small, insignificant tasks and ignoring the tasks that were most important. Other reasons for failing are partnering with the wrong people, not being able to sell your product to the right customers at the right time at the right price… and many more reasons!

Interviewer: As an entrepreneur, how do you feel failure should be looked at?

Shyam: I believe we should all look at failure as an asset, rather than as something negative. The way I see it, if you have an idea, you should try to make it work, even if there is a chance that you will fail. That's because not trying is failure right there, anyway! And failure is not the worst thing that can happen. I think having regrets because of not trying, and wondering 'what if' is far worse than trying and actually failing.

Interviewer: How did you feel when you failed for the first time?

Shyam: I was completely heartbroken! It was a very painful experience. But the good news is, you do recover from the failure. And with every subsequent failure, the recovery process gets a lot easier. That's because you start to see each failure more as a lesson that will eventually help you succeed, rather than as an obstacle that you cannot overcome. You will start to realize that failure has many benefits.

Interviewer: Can you tell us about some of the benefits of failing?

Shyam: One of the benefits that I have experienced personally from failing is that the failure made me see things in a new light. It gave me answers that I didn't have before. Failure can make you a lot stronger. It also helps keep your ego in control.

Interviewer: What advice would you give entrepreneurs who are about to start their own enterprises?

Shyam: I would tell them to do their research and ensure that their product is something that is actually wanted by customers. I'd tell them to pick their partners and employees very wisely and cautiously. I'd tell them that it's very important to be aggressive – push and market your product as aggressively as possible. I would warn them that starting an enterprise is very expensive and that they should be prepared for a situation where they run out of money.

I would tell them to create long term goals and put a plan in action to achieve that goal. I would tell them to build a product that is truly unique. Be very careful and ensure that you are not copying another startup. Lastly, I'd tell them that it's very important that they find the right investors.

Interviewer: That's some really helpful advice, Shyam! I'm sure this will help all entrepreneurs to be more prepared before they begin their journey! Thank you for all your insight!

Tips

- Remember that nothing is impossible.
- Identify your mission and your purpose before you start.
- Plan your next steps – don't make decisions hastily.

6.6: Preparing to be an Entrepreneur

Unit Objectives

At the end of this unit, you will be able to:

1. Discuss how market research is carried out
2. Describe the 4 Ps of marketing
3. Discuss the importance of idea generation
4. Recall basic business terminology
5. Discuss the need for CRM
6. Discuss the benefits of CRM
7. Discuss the need for networking
8. Discuss the benefits of networking
9. Understand the importance of setting goals
10. Differentiate between short-term, medium-term and long-term goals
11. Discuss how to write a business plan
12. Explain the financial planning process
13. Discuss ways to manage your risk
14. Describe the procedure and formalities for applying for bank finance
15. Discuss how to manage your own enterprise
16. List important questions that every entrepreneur should ask before starting an enterprise

6.6.1 Market Study / The 4 Ps of Marketing / Importance of an IDEA: Understanding Market Research

Market research is the process of gathering, analyzing and interpreting market information on a product or service that is being sold in that market. It also includes information on:

- Past, present and prospective customers
- Customer characteristics and spending habits
- The location and needs of the target market
- The overall industry
- Relevant competitors

Market research involves two types of data:

- Primary information. This is research collected by yourself or by someone hired by you.
- Secondary information. This is research that already exists and is out there for you to find and use.

Primary research

Primary research can be of two types:

- Exploratory: This is open-ended and usually involves detailed, unstructured interviews.
- Specific: This is precise and involves structured, formal interviews. Conducting specific research is the more expensive than conducting exploratory research.

Secondary research

Secondary research uses outside information. Some common secondary sources are:

- Public sources: These are usually free and have a lot of good information. Examples are government departments, business departments of public libraries etc.
- Commercial sources: These offer valuable information but usually require a fee to be paid. Examples are research and trade associations, banks and other financial institutions etc.
- Educational institutions: These offer a wealth of information. Examples are colleges, universities, technical institutes etc.

The 4 Ps of Marketing

The 4 Ps of marketing are Product, Price, Promotion and Place. Let's look at each of these 4 Ps in detail.

Product

A product can be:

- A tangible good
- An intangible service

Whatever your product is, it is critical that you have a clear understanding of what you are offering, and what its unique characteristics are, before you begin with the marketing process.

Some questions to ask yourself are:

- What does the customer want from the product/service?
- What needs does it satisfy?
- Are there any more features that can be added?
- Does it have any expensive and unnecessary features?
- How will customers use it?
- What should it be called?
- How is it different from similar products?
- How much will it cost to produce?
- Can it be sold at a profit?

Price

Once all the elements of Product have been established, the Price factor needs to be considered.

The Price of a Product will depend on several factors such as profit margins, supply, demand and the marketing strategy.

Some questions to ask yourself are:

- What is the value of the product/service to customers?
- Do local products/services have established price points?
- Is the customer price sensitive?
- Should discounts be offered?
- How is your price compared to that of your competitors?

Promotion

Once you are certain about your Product and your Price, the next step is to look at ways to promote it. Some key elements of promotion are advertising, public relations, social media marketing, email marketing, search engine marketing, video marketing and more.

Some questions to ask yourself are:

- Where should you promote your product or service?
- What is the best medium to use to reach your target audience?
- When would be the best time to promote your product?
- How are your competitors promoting their products?

Place

According to most marketers, the basis of marketing is about offering the right product, at the right price, at the right place, at the right time. For this reason, selecting the best possible location is critical for converting prospective clients into actual clients.

Some questions to ask yourself are:

- Will your product or service be looked for in a physical store, online or both?
- What should you do to access the most appropriate distribution channels?
- Will you require a sales force?
- Where are your competitors offering their products or services?
- Should you follow in your competitors' footsteps?
- Should you do something different from your competitors?

Importance of an IDEA

Ideas are the foundation of progress. An idea can be small or ground-breaking, easy to accomplish or extremely complicated to implement. Whatever the case, the fact that it is an idea gives it merit. Without ideas, nothing is possible. Most people are afraid to speak out their ideas, out for fear of being ridiculed. However, if are an entrepreneur and want to remain competitive and innovative, you need to bring your ideas out into the light.

Some ways to do this are by:

- Establishing a culture of brainstorming where you invite all interested parties to contribute
- Discussing ideas out loud so that people can add their ideas, views, opinions to them
- Being open minded and not limiting your ideas, even if the idea who have seems ridiculous
- Not discarding ideas that you don't work on immediately, but instead making a note of them and shelving them so they can be revisited at a later date

Tips

- Keep in mind that good ideas do not always have to be unique.
- Remember that timing plays a huge role in determining the success of your idea.
- Situations and circumstances will always change, so be flexible and adapt your idea accordingly.

6.6.2 Business Entity Concepts: Basic Business Terminology

If your aim is to start and run a business, it is crucial that you have a good understanding of basic business terms. Every entrepreneur should be well versed in the following terms:

- Accounting: A systematic method of recording and reporting financial transactions.
- Accounts payable: Money owed by a company to its creditors.
- Accounts Receivable: The amount a company is owed by its clients.
- Assets: The value of everything a company owns and uses to conduct its business.
- Balance Sheet: A snapshot of a company's assets, liabilities and owner's equity at a given moment.
- Bottom Line: The total amount a business has earned or lost at the end of a month.
- Business: An organization that operates with the aim of making a profit.
- Business to Business (B2B): A business that sells goods or services to another business.
- Business to Consumer (B2C): A business that sells goods or services directly to the end user.
- Capital: The money a business has in its accounts, assets and investments. The two main types of capital are debt and equity.
- Cash Flow: The overall movement of funds through a business each month, including income and expenses.
- Cash Flow Statement: A statement showing the money that entered and exited a business during a specific period of time.
- Contract: A formal agreement to do work for pay.
- Depreciation: The degrading value of an asset over time.
- Expense: The costs that a business incurs through its operations.
- Finance: The management and allocation of money and other assets.
- Financial Report: A comprehensive account of a business' transactions and expenses.
- Fixed Cost: A one-time expense.
- Income Statement (Profit and Loss Statement): Shows the profitability of a business during a period of time.
- Liabilities: The value of what a business owes to someone else.
- Marketing: The process of promoting, selling and distributing a product or service.
- Net Income/Profit: Revenues minus expenses.
- Net Worth: The total value of a business.
- Payback Period: The amount of time it takes to recover the initial investment of a business.
- Profit Margin: The ratio of profit, divided by revenue, displayed as a percentage.
- Return on Investment (ROI): The amount of money a business gets as return from an investment.

- Revenue: The total amount of income before expenses are subtracted.
- Sales Prospect: A potential customer.
- Supplier: A provider of supplies to a business.
- Target Market: A specific group of customers at which a company's products and services are aimed.
- Valuation: An estimate of the overall worth of the business.
- Variable Cost: Expenses that change in proportion to the activity of a business.
- Working Capital: Calculated as current assets minus current liabilities.

6.6.3 CRM & Networking: What is CRM?

CRM stands for Customer Relationship Management. Originally the expression Customer Relationship Management meant managing one's relationship with customers. However, today it refers to IT systems and software designed to help companies manage their relationships.

The Need for CRM

The better a company can manage its relationships with its customers, the higher the chances of the company's success. For any entrepreneur, the ability to successfully retain existing customers and expand the enterprise is paramount. This is why IT systems that focus on addressing the problems of dealing with customers on a daily basis are becoming more and more in demand.

Customer needs change over time, and technology can make it easier to understand what customers really want. This insight helps companies to be more responsive to the needs of their customers. It enables them to modify their business operations when required, so that their customers are always served in the best manner possible. Simply put, CRM helps companies recognize the value of their clients and enables them to capitalize on improved customer relations.

Benefits of CRM

CRM has a number of important benefits:

- It helps improve relations with existing customers which can lead to:
  - Increased sales
  - Identification of customer needs
  - Cross-selling of products
- It results in better marketing of one's products or services
- It enhances customer satisfaction and retention
- It improves profitability by identifying and focusing on the most profitable customers

What is Networking?

In business, networking means leveraging your business and personal connections in order to bring in a regular supply of new business. This marketing method is effective as well as low cost. It is a great way to develop sales opportunities and contacts. Networking can be based on referrals and introductions, or can take place via phone, email, and social and business networking websites.

The Need for Networking

Networking is an essential personal skill for business people, but it is even more important for entrepreneurs. The process of networking has its roots in relationship building. Networking results in greater communication and a stronger presence in the entrepreneurial ecosystem. This helps build strong relationships with other entrepreneurs.

Business networking events held across the globe play a huge role in connecting like-minded entrepreneurs who share the same fundamental beliefs in communication, exchanging ideas and converting ideas into realities. Such networking events also play a crucial role in connecting entrepreneurs with potential investors. Entrepreneurs may have vastly different experiences and backgrounds but they all have a common goal in mind – they all seek connection, inspiration, advice, opportunities and mentors. Networking offers them a platform to do just that.

Benefits of Networking

Networking offers numerous benefits for entrepreneurs. Some of the major benefits are:

- Getting high quality leads
- Increased business opportunities
- Good source of relevant connections
- Advice from like-minded entrepreneurs
- Gaining visibility and raising your profile
- Meeting positive and enthusiastic people
- Increased self-confidence
- Satisfaction from helping others
- Building strong and lasting friendships

Tips

- Use social media interactions to identify needs and gather feedback.
- When networking, ask open-ended questions rather than yes/no type questions.

6.6.4 Business Plan: Why Set Goals

Setting goals is important because it gives you long-term vision and short-term motivation. Goals can be short term, medium term and long term.

Short-Term Goals

- These are specific goals for the immediate future.

Example: Repairing a machine that has failed.

Medium-Term Goals

- These goals are built on your short term goals.
- They do not need to be as specific as your short term goals.

Example: Arranging for a service contract to ensure that your machines don't fail again.

Long-Term Goals

These goals require time and planning.

They usually take a year or more to achieve.

Example: Planning your expenses so you can buy new machinery

Why Create a Business Plan

A business plan is a tool for understanding how your business is put together. It can be used to monitor progress, foster accountable and control the fate of the business. It usually offers a 3-5 year projection and outlines the plan that the company intends to follow to grow its revenues. A business plan is also a very important tool for getting the interest of key employees or future investors.

A business plan typically comprises of eight elements.

Elements of a Business Plan

Executive Summary

The executive summary follows the title page. The summary should clearly state your desires as the business owner in a short and businesslike way. It is an overview of your business and your plans. Ideally this should not be more than 1-2 pages.

Your Executive Summary should include:

- The Mission Statement: Explain what your business is all about.

  Example: Nike's Mission Statement

  Nike's mission statement is "To bring inspiration and innovation to every athlete in the world."
- Company Information: Provide information like when your business was formed, the names and roles of the founders, the number of employees, your business location(s) etc.
- Growth Highlights: Mention examples of company growth. Use graphs and charts where possible.
- Your Products/Services: Describe the products or services provided.
- Financial Information: Provide details on current bank and investors.
- Summarize future plans: Describe where you see your business in the future.

Business Description

The second section of your business plan needs to provide a detailed review of the different elements of your business. This will help potential investors to correctly understand your business goal and the uniqueness of your offering.

Your Business Description should include:

- A description of the nature of your business
- The market needs that you are aiming to satisfy
- The ways in which your products and services meet these needs
- The specific consumers and organizations that you intend to serve
- Your specific competitive advantages

Market Analysis

The market analysis section usually follows the business description. The aim of this section is to showcase your industry and market knowledge. This is also the section where you should lay down your research findings and conclusions.

Your Market Analysis should include:

- Your industry description and outlook
- Information on your target market
- The needs and demographics of your target audience
- The size of your target market
- The amount of market share you want to capture
- Your pricing structure
- Your competitive analysis
- Any regulatory requirements

Organization & Management

This section should come immediately after the Market Analysis.

Your Organization & Management section should include:

- Your company's organizational structure
- Details of your company's ownership
- Details of your management team
- Qualifications of your board of directors
- Detailed descriptions of each division/department and its function
- The salary and benefits package that you offer your people
- The incentives that you offer

Service or Product Line

The next section is the service or product line section. This is where you describe your service or product, and stress on their benefits to potential and current customers. Explain in detail why your product of choice will fulfill the needs of your target audience.

Your Service or Product Line section should include:

- A description of your product/service
- A description of your product or service's life cycle
- A list of any copyright or patent filings
- A description of any R&D activities that you are involved in or planning

Marketing & Sales

Once the Service or Product Line section of your plan has been completed, you should start on the description of the marketing and sales management strategy for your business.

Your Marketing section should include the following strategies:

- **Market penetration strategy**: This strategy focuses on selling your existing products or services in existing markets, in order to increase your market share.
- **Growth strategy**: This strategy focuses on increasing the amount of market share, even if it reduces earnings in the short-term.
- **Channels of distribution strategy**: These can be wholesalers, retailers, distributers and even the internet.
- **Communication strategy**: These can be written strategies (e-mail, text, chat), oral strategies (phone calls, video chats, face-to-face conversations), non-verbal strategies (body language, facial expressions, tone of voice) and visual strategies (signs, webpages, illustrations).

Your Sales section should include the following information:

- **A salesforce strategy**: This strategy focuses on increasing the revenue of the enterprise.
- **A breakdown of your sales activities**: This means detailing out how you intend to sell your products or services – will you sell it offline or online, how many units do you intend to sell, what price do you plan to sell each unit at, etc.

Funding Request

This section is specifically for those who require funding for their venture.

The Funding Request section should include the following information:

- How much funding you currently require.
- How much funding you will require over the next five years. This will depend on your long-term goals.
- The type of funding you want and how you plan to use it. Do you want funding that can be used only for a specific purpose, or funding that can be used for any kind of requirement?
- Strategic plans for the future. This will involve detailing out your long-term plans – what these plans are and how much money you will require to put these plans in motions.
- Historical and prospective financial information. This can be done by creating and maintaining all your financial records, right from the moment your enterprise started, to the present day. Documents required for this are your balance sheet which contains details of your company's assets and liabilities, your income statement which lists your company's revenues, expenses and net income for the year, your tax returns (usually for the last three years) and your cash flow budget which lists the cash that came in, the cash that went out and states whether you had a cash deficit (negative balance) or surplus (positive balance) at the end of each month.

Financial Planning

Before you begin building your enterprise, you need to plan your finances. Take a look at the steps for financial planning:

Step 1: Create a financial plan. This should include your goals, strategies and timelines for accomplishing these goals.

Step 2: Organize all your important financial documents. Maintain a file to hold your investment details, bank statements, tax papers, credit card bills, insurance papers and any other financial records.

Step 3: Calculate your net worth. This means figure out what you own (assets like your house, bank accounts, investments etc.), and then subtract what you owe (liabilities like loans, pending credit card amounts etc.) the amount you are left with is your net worth.

Step 4: Make a spending plan. This means write down in detail where your money will come from, and where it will go.

Step 5: Build an emergency fund. A good emergency fund contains enough money to cover at least 6 months' worth of expenses.

Step 6: Set up your insurance. Insurance provides long term financial security and protects you against risk.

Risk Management

As an entrepreneur, it is critical that you evaluate the risks involved with the type of enterprise that you want to start, before you begin setting up your company. Once you have identified potential risks, you can take steps to reduce them. Some ways to manage risks are:

- Research similar business and find out about their risks and how they were minimized.
- Evaluate current market trends and find out if similar products or services that launched a while ago are still being well received by the public.
- Think about whether you really have the required expertise to launch your product or service.
- Examine your finances and see if you have enough income to start your enterprise.
- Be aware of the current state of the economy, consider how the economy may change over time, and think about how your enterprise will be affected by any of those changes.
- Create a detailed business plan.

Tips

- Ensure all the important elements are covered in your plan.
- Scrutinize the numbers thoroughly.
- Be concise and realistic.
- Be conservative in your approach and your projections.
- Use visuals like charts, graphs and images wherever possible.

6.6.5 Procedure and Formalities for Bank Finance:

The Need for Bank Finance

For entrepreneurs, one of the most difficult challenges faced involves securing funds for startups. With numerous funding options available, entrepreneurs need to take a close look at which funding methodology works best for them. In India, banks are one of the largest funders of startups, offering funding to thousands of startups every year.

What Information Should Entrepreneurs Offer Banks for Funding?

When approaching a bank, entrepreneurs must have a clear idea of the different criteria that banks use to screen, rate and process loan applications. Entrepreneurs must also be aware of the importance of providing banks with accurate and correct information. It is now easier than ever for financial institutions to track any default behaviour of loan applicants. Entrepreneurs looking for funding from banks must provide banks with information relating to their general credentials, financial situation and guarantees or collaterals that can be offered.

General Credentials

This is where you, as an entrepreneur, provide the bank with background information on yourself. Such information includes:

- Letter(s) of Introduction: This letter should be written by a respected business person who knows you well enough to introduce you. The aim of this letter is set across your achievements and vouch for your character and integrity.
- Your Profile: This is basically your resume. You need to give the bank a good idea of your educational achievements, professional training, qualifications, employment record and achievements.
- Business Brochure: A business brochure typically provides information on company products, clients, how long the business has been running for etc.
- Bank and Other References: If you have an account with another bank, providing those bank references is a good idea.
- Proof of Company Ownership or Registration: In some cases, you may need to provide the bank with proof of company ownership and registration. A list of assets and liabilities may also be required.

Financial Situation

Banks will expect current financial information on your enterprise. The standard financial reports you should be prepared with are:

- Balance Sheet
- Cash-Flow Statement
- Business Plan
- Profit-and-Loss Account
- Projected Sales and Revenues
- Feasibility Study

Guarantees or Collaterals

Usually banks will refuse to grant you a loan without security. You can offer assets which the bank can seize and sell off if you do not repay the loan. Fixed assets like machinery, equipment, vehicles etc. are also considered to be security for loans.

The Lending Criteria of Banks

Your request for funding will have a higher chance of success if you can satisfy the following lending criteria:

- Good cash flow
- Adequate shareholders' funds
- Adequate security
- Experience in business
- Good reputation

The Procedure

To apply for funding the following procedure will need to be followed.

1. Submit your application form and all other required documents to the bank.
2. The bank will carefully assess your credit worthiness and assign ratings by analyzing your business information with respect to parameters like management, financial, operational and industry information as well as past loan performance.
3. The bank will make a decision as to whether or not you should be given funding.

Tips 

- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

6.6.6 Enterprise Management - An Overview: How to Manage Your Enterprise

To manage your enterprise effectively you need to look at many different aspects, right from managing the day-to-day activities to figuring out how to handle a large scale event. Let's take a look at some simple steps to manage your company effectively.

Step 1: Use your leadership skills and ask for advice when required.

Let's take the example of Ramu, an entrepreneur who has recently started his own enterprise. Ramu has good leadership skills – he is honest, communicates well, knows how to delegate work etc. These leadership skills definitely help Ramu in the management of his enterprise. However, sometimes Ramu comes across situations that he is unsure how to handle. What should Ramu do in this case? One solution is for him to find a more experienced manager who is willing to mentor him. Another solution is for Ramu to use his networking skills so that he can connect with managers from other organizations, who can give him advice on how to handle such situations.

Step 2: Divide your work amongst others – realize that you cannot handle everything yourself.

Even the most skilled manager in the world will not be able to manage every single task that an enterprise will demand of him. A smart manager needs to realize that the key to managing his enterprise lies in his dividing all his work between those around him. This is known as delegation. However, delegating is not enough. A manager must delegate effectively if he wants to see results. This is important because delegating, when done incorrectly, can result in you creating even more work for yourself. To delegate effectively, you can start by making two lists. One list should contain the things that you know you need to handle yourself. The second list should contain the things that you are confident can be given to others to manage and handle. Besides incorrect delegation, another issue that may arise is over-delegation. This means giving away too many of your tasks to others. The problem with this is, the more tasks you delegate, the more time you will spend tracking and monitoring the work progress of those you have handed the tasks to. This will leave you with very little time to finish your own work.

Step 3: Hire the right people for the job.

Hiring the right people goes a long way towards effectively managing your enterprise. To hire the best people suited for the job, you need to be very careful with your interview process. You should ask potential candidates the right questions and evaluate their answers carefully. Carrying out background checks is always a good practice. Running a credit check is also a good idea, especially if the people you are planning to hire will be handling your money. Create a detailed job description for each role that you want filled and ensure that all candidates have a clear and correct understanding of the job description. You should also have an employee manual in place, where you

put down every expectation that you have from your employees. All these actions will help ensure that the right people are approached for running your enterprise.

Step 4: Motivate your employees and train them well.

Your enterprise can only be managed effectively if your employees are motivated to work hard for your enterprise. Part of being motivated involves your employees believing in the vision and mission of your enterprise and genuinely wanting to make efforts towards pursuing the same. You can motivate your employees with recognition, bonuses and rewards for achievements. You can also motivate them by telling them about how their efforts have led to the company's success. This will help them feel pride and give them a sense of responsibility that will increase their motivation.

Besides motivating your people, your employees should be constantly trained in new practices and technologies. Remember, training is not a one-time effort. It is a consistent effort that needs to be carried out regularly.

Step 5: Train your people to handle your customers well.

Your employees need to be well-versed in the art of customer management. This means they should be able to understand what their customers want, and also know how to satisfy their needs. For them to truly understand this, they need to see how you deal effectively with customers. This is called leading by example. Show them how you sincerely listen to your clients and the efforts that you put into understand their requirements. Let them listen to the type of questions that you ask your clients so they understand which questions are appropriate.

Step 6: Market your enterprise effectively.

Use all your skills and the skills of your employees to market your enterprise in an effective manner. You can also hire a marketing agency if you feel you need help in this area.

Now that you know what is required to run your enterprise effectively, put these steps into play, and see how much easier managing your enterprise becomes!

Tips

- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

6.6.7. 20 Questions to Ask Yourself Before Considering Entrepreneurship

1. Why am I starting a business?
2. What problem am I solving?
3. Have others attempted to solve this problem before? Did they succeed or fail?
4. Do I have a mentor[1] or industry expert that I can call on?
5. Who is my ideal customer[2]?
6. Who are my competitors[3]?
7. What makes my business idea different from other business ideas?
8. What are the key features of my product or service?
9. Have I done a SWOT[4] analysis?
10. What is the size of the market that will buy my product or service?
11. What would it take to build a minimum viable product[5] to test the market?
12. How much money do I need to get started?
13. Will I need to get a loan?
14. How soon will my products or services be available?
15. When will I break even[6] or make a profit?
16. How will those who invest in my idea make a profit?
17. How should I set up the legal structure[7] of my business?
18. What taxes[8] will I need to pay?
19. What kind of insurance[9] will I need?
20. Have I reached out to potential customers for feedback?

Tips

- It is very important to validate your business ideas before you invest significant time, money and resources into it.
- The more questions you ask yourself, the more prepared you will be to handle to highs and lows of starting an enterprise.

Footnotes:

1. A mentor is a trusted and experienced person who is willing to coach and guide you.
2. A customer is someone who buys goods and/or services.
3. A competitor is a person or company that sells products and/or services similar to your products and/or services.
4. SWOT stands for Strengths, Weaknesses, Opportunities and Threats. To conduct a SWOT analysis of your company, you need to list down all the strengths and weaknesses of your company, the opportunities that are present for your company and the threats faced by your company.

5. A minimum viable product is a product that has the fewest possible features, that can be sold to customers, for the purpose of getting feedback from customers on the product.
6. A company is said to break even when the profits of the company are equal to the costs.
7. The legal structure could be a sole proprietorship, partnership or limited liability partnership.
8. There are two types of taxes – direct taxes payable by a person or a company, or indirect taxes charged on goods and/or services.
9. There are two types of insurance – life insurance and general insurance. Life insurance covers human life while general insurance covers assets like animals, goods, cars etc.

Notes

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