

**SRI CHANDRASEKHARENDRA SARASWATHI VISWA MAHA
VIDYALAYA**

(University Established under section 3 of UGC Act, 1956)

DEPARTMENT OF MECHANICAL ENGINEERING

Name of the Course : **Automobile Engineering**
Name of the unit : **Vehicle Structure and Engines**
Topic – Title : **Vehicle construction (Chassis and Frame)**

1. Aim and Objectives:

The anatomy of the automobile in general. To understand the basics of Automobile Engineering, role of automobile industry in country growth and detailed study about the internal combustions engines.

2. Pre-Test - MCQ type:

1. In which year was the first automobile built?
a) 1759 **b) 1769** c) 1785 d) 1790
2. Sir Rudolf Diesel invented diesel engine in which year?
a) 1905 b) 1916 c) 1920 **d) 1913**
3. Ford started production of his model ‘T’ car with an initial run of how many vehicles
a) 15000 b) 6000 c) 2000 **d) 20000**
4. Two door and four door type automobiles are classified as
a) Sedan b) Convertible c) Special purpose vehicles d) Pick ups
5. First car arrived in India in which year
a) 1890 b) 1893 **c) 1897** d) 1901
6. Which one of these is a Sports car?
a) Honda S2000 b) Mercedes-Benz S-Class
c) Audi A6 **d) Porsche 911**
7. What was the initial price tag of ‘Tata Nano’ a city car by Tata Motors
a) Rs.1,50,000 **b) Rs.1,00,000**
c) Rs.2,50,000 d) Rs.2,00,000
8. Mercedes-Benz E Class is
a) A compact minivan b) An estate car
c) An executive car d) A compact executive car

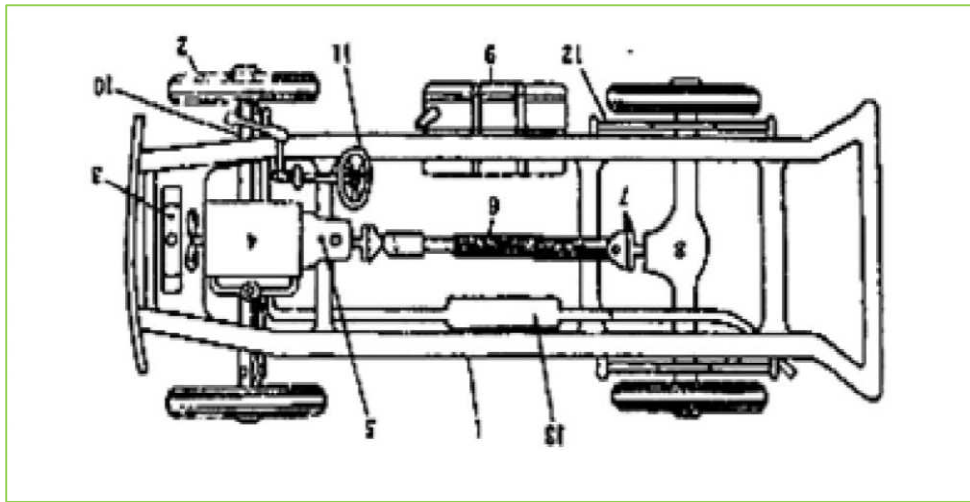
9. Ford Falcon is an example of
- a) **Australian muscle car**
 - b) American muscle car
 - c) Luxury vehicle
 - d) None of the mentioned
10. Which type of fuel used in trucks and busses
- a) Petrol
 - b) LPG
 - c) CNG
 - d) **Diesel**

3. Prerequisites:

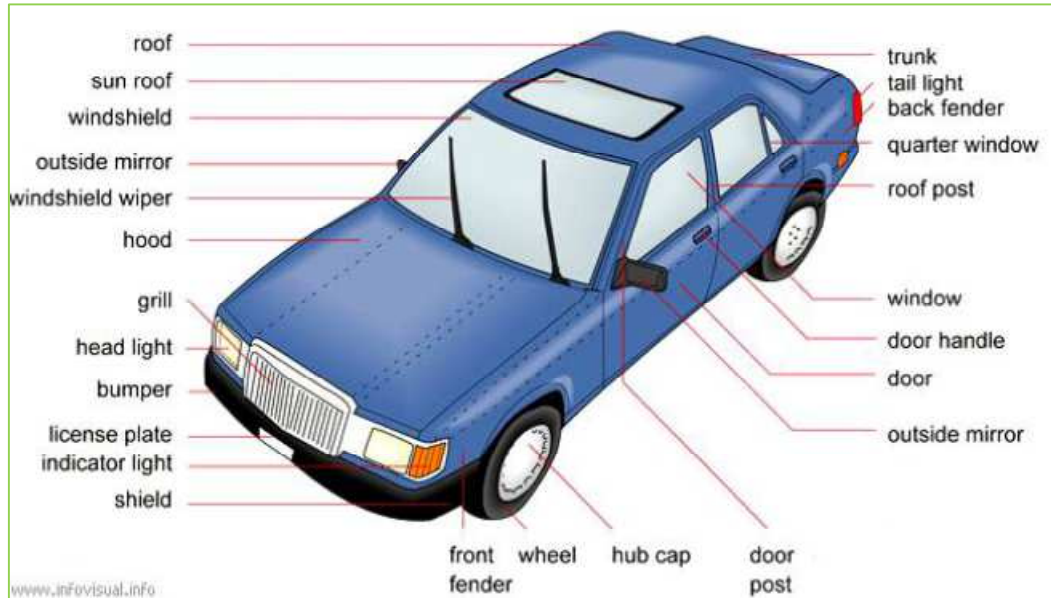
The basic knowledge about the existing two and four-wheeler basic specifications.

4. Theory Behind:

INTRODUCTION



An Automobile is a self-propelled vehicle which contains the power source for its propulsion and is used for carrying passengers and goods on the ground, such as car, bus, trucks, etc.



Types of Automobile

The automobiles are classified by the following ways,

1. On the Basis of Load

- Heavy transport vehicle (HTV) or heavy motor vehicle (HMV),
- Light transport vehicle (LTV), Light motor vehicle (LMV),

2. On the Basis of Wheels

- Two-wheeler vehicle, for example: Scooter, motorcycle, scooty, etc.
- Three-wheeler vehicle, for example: Autorickshaw,
- Three-wheeler scooter for handicaps and tempo, etc.
- Four-wheeler vehicle, for example: Car, jeep, trucks, buses, etc.
- Six-wheeler vehicle, for example: Big trucks with two gear axles.

3. On the basis of Fuel Used

- Petrol vehicle, e.g. motorcycle, scooter, cars, etc.
- Diesel vehicle, e.g. trucks, buses, etc.
- Electric vehicle which use battery to drive.
- Steam vehicle, e.g. an engine which uses steam engine.
- Gas vehicle, e.g. LPG and CNG vehicles, where LPG is liquefied

4. On the basis of body style

- Sedan Hatchback car.
- Coupe car Station wagon Convertible.
- Van Special purpose vehicle, e.g. ambulance, milk van, etc.

5. On the basis of Transmission

- Conventional vehicles with manual transmission, e.g. car with 5 gears.
- Semi-automatic
- Automatic: In automatic transmission, gears are not required to be changed manually.

6. On the basis of Drive

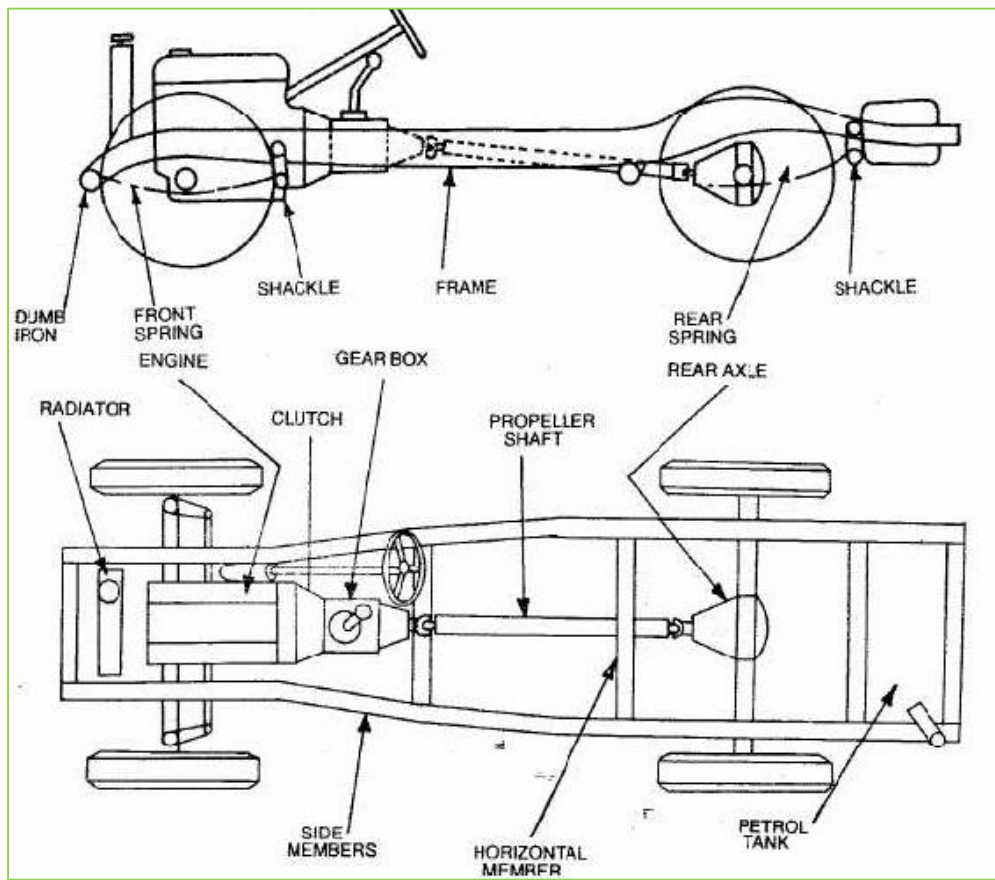
- Left hand drive
- Right hand drive

7. On the basis of Driving Axle

- Front wheel drive
- Rear wheel drive
- All wheel drives

8. Position of Engine

- Engine in Front - Most of the vehicles have engine in the front. Example: most of the cars,
- Engine in the Rear Side Very few vehicles have engine located in the rear. Example: Nano car.



An automobile is made up of mainly two units, these are Chassis and Body.

“Frame” + “Base components” = “Chassis”

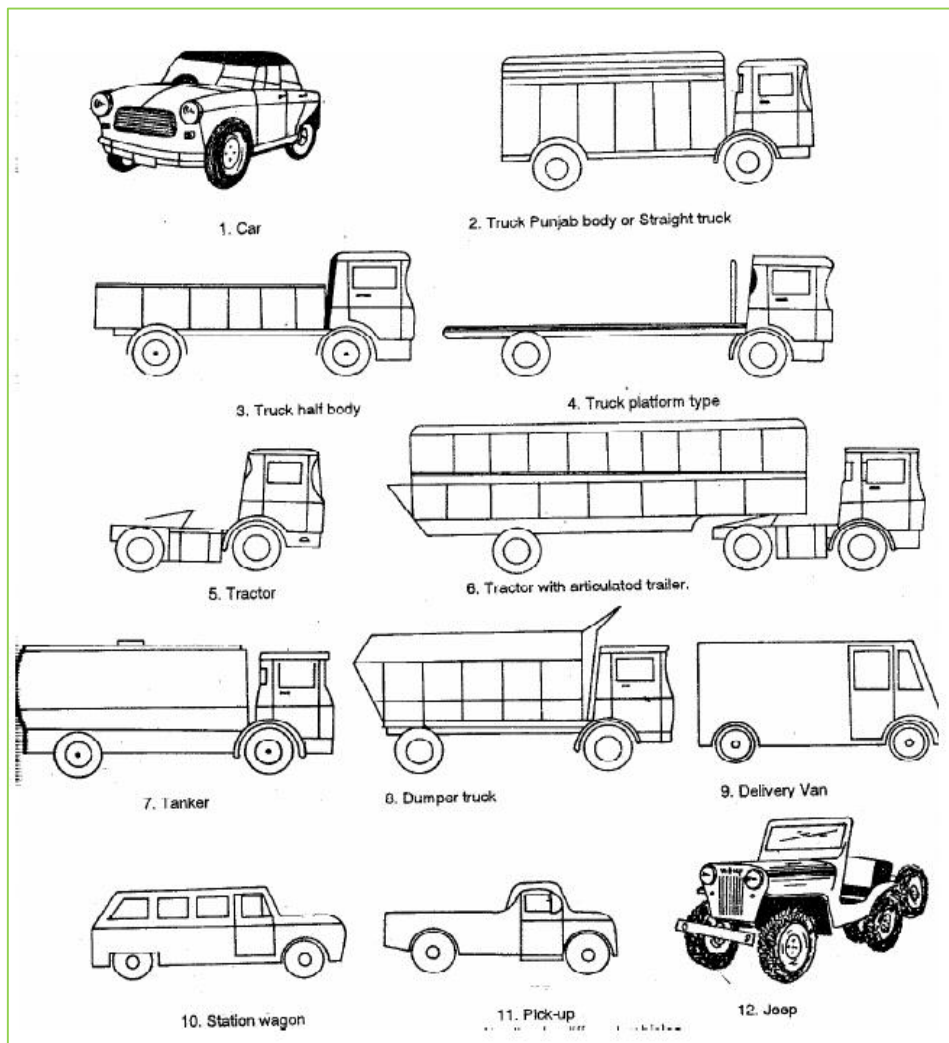
“Chassis” + “Body” = “Vehicle”

Body:

Body is the superstructure of the vehicle and it is bolted to the chassis.

Types;

- ✓ Car
- ✓ Truck
- ✓ Tractor
- ✓ Delivery van
- ✓ Jeep
- ✓ Bus, etc.,



Fundamental Concept

Understanding the motion of air around an object (often called a flow field) enables the calculation of forces and moments acting on the object. In many aerodynamics problems, the forces of interest are the fundamental forces of flight: lift, drag, thrust, and weight. Of these, lift and drag are aerodynamic forces, i.e. forces due to air flow over a solid body.

5. Applications / Simulation / Related Laboratory example

Applications of Ladder frame:

Heavy commercial vehicles such as trucks and buses mainly use the ladder frame structure.

Some light commercial vehicles like pickup trucks also use the ladder frame.

Applications of Tubular frame:

Some racing vehicles and All-Terrain vehicles use tubular frame design.

Applications of Monocoque:

Almost all high-performance cars use monocoque design.

6. MCQ- post-test

1. Which of these is not necessary for the description of an automobile
a) Type b) Capacity **c) Colour** d) Model
2. Which of these is necessary for the description of an automobile
a) Make b) Model c) Capacity **d) All of the mentioned**
3. A 4*2 drive vehicle implies that
a) It has $4*2=8$ wheels
b) It has 2 auxiliary wheels and 4 drive wheels
c) It has 4 wheels out of which 2 are drive wheels
d) None of the mentioned
4. The transmission system transmits _____ from engine to wheels.
a) Speed **b) Power** c) Current d) Pressure
5. Which of the following is not a part of the transmission system
a) Clutch b) Axles **c) Wheels** d) Gear box
6. Which of these were or are used in automobiles to provide suspension.
a) Leaf springs b) Coil springs
c) Torsion bars **d) All of the mentioned.**
7. The loads supported by an automobile frame are
a) Weight of the body, passengers and cargo loads
b) Torque from engine and transmission

- c) Sudden impacts from collisions
 - d) All of the mentioned**
8. An automobile chassis does not include which one of the following parts
- a) Shock absorbers
 - b) Steering system
 - c) Differential**
 - d) Brakes
9. Which of these falls under LMV (Light Motor Vehicle) category based on capacity?
- a) Motorbikes
 - b) Cars**
 - c) Buses
 - d) Trains
10. Abbreviation HEVs stands for what
- a) Highly Efficient Vehicles
 - b) Hybrid Electric Vehicles**
 - c) Highly Economic Vehicles
 - d) Highly Engineered Vehicles

7. Conclusion

- Recognized to identify and description of different components and system of automobile and history of automobile.
- Understood basics of automobile and studied the basics of frame body construction.
- Understood about the various types of automobile vehicles.
- The importance of automobile vehicles in various applications like commercial, domestic, industrial applications etc.

8. References

- Kirpal Singh, “Automobile Engineering”, Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 15th Edition 2017.

9. Audio/ video - if any

<https://www.youtube.com/watch?v=qfkTVYJIx8Q>

10. Assignments

- Draw the various types of chassis and frames of a vehicle and mention the parts.