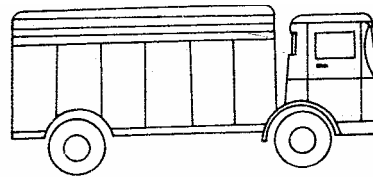
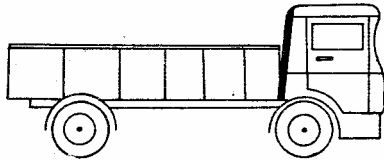


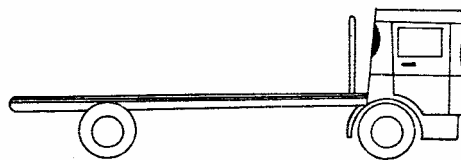
1. Car



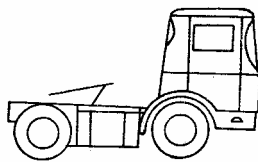
2. Truck Punjab body or Straight truck



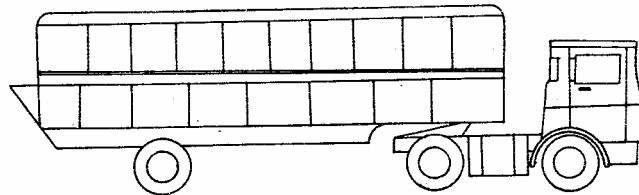
3. Truck half body



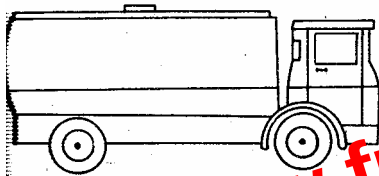
4. Truck platform type



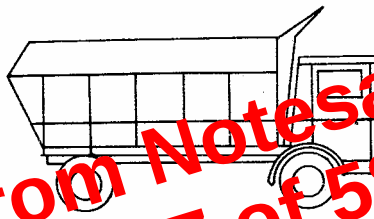
5. Tractor



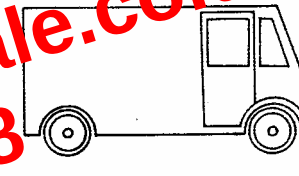
6. Tractor with articulated trailer.



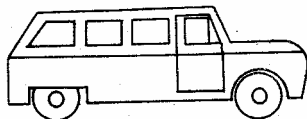
7. Tanker



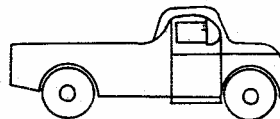
8. Dumper truck



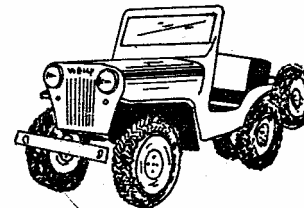
9. Delivery Van



10. Station wagon



11. Pick-up



12. Jeep

According to Chassis design the body can divided into

1. Conventional Type
2. Integral Type
3. Semi- Integral Type

According to other usage:

1. Light vehicle Bodies - cars, jeeps
2. Heavy vehicle Bodies – Busses, Lorries
3. Medium vehicle Bodies - Vans, Metadoors

REQUIREMENTS OF BODIES FOR VARIOUS TYPES OF VEHICLE:

The body of the most vehicle should fulfill the following requirements:

1. The body should be light.
2. It should have minimum number of components.
3. It should provide sufficient space for passengers and luggage.
4. It should withstand vibrations while in motion.
5. It should offer minimum resistance to air.
6. It should be cheap and easy in manufacturing.
7. It should be attractive in shape and colour.
8. It should have uniformly distributed load.
9. It should have long fatigue life
10. It should provide good vision and ventilation.

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Short Answer Questions:

1. List out the various components of chassis?
2. What are the functions of Chassis frame?
3. List out the types of Chassis frame?
4. What are the frame sections used in Automobiles?
5. What are the requirements of Bodies for various types of vehicles?

Essay Type Questions:

1. Draw the layout of conventional Chassis with a neat diagram and explain about various parts on it?
2. What are the different classification of bodies used in Automobiles and explain?

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undue stresses on the steering mechanism, therefore some degree of irreversibility is also desired.

Steering Mechanism: There are two types of steering gear mechanisms
1. Davis Steering gear 2. Ackermann Steering gear]

1. Davis Steering Gear: The Davis Steering gear has sliding pair, it has more friction than the turning pair, therefore the Davis Steering Gear wears out earlier and becomes inaccurate after certain time. This type is mathematically Accurate.

The Davis gear mechanism consists of cross link KL sliding parallel to another link AB and is connected to the stub axle of the two front wheels by levers ACK and DBK pivoted at A and B respectively. The cross link KL slides in the bearing and cross pins at its ends K and L. The slide blocks are pivoted on these pins and move with the turning of bell crank levers as the steering wheel is operated. When the vehicle is running straight the gear is said to be in its mid-position. The short arms AK and BL are inclined at an angle α to their stub axles AC and BD respectively. The correct steering depends upon the suitable selection of cross arm angle α , and is given by

$\tan \alpha = b/2l$ Where $b = AB$ = distance between the pivots of front axle.
 l = wheel base

2. Ackermann Steering System: It has only turning pair. It is not mathematically accurate except in three positions. The track arms are made inclined so that if the axles are extended they will meet on the longitudinal axis of the car near rear axle. This system is called Ackermann steering.

STEERING DEFECTS AND THEIR CAUSES AND REMEDIES:

1. Wheel wobble: The oscillation of the front wheels at low speeds is called wheel wobble.

Causes	Remedies
a. In Correct Dynamic Balancing of wheels.	a. Correct the wheel balance
b. Uneven Tyre pressure	b. Check the tyre pressure
c. The camber may be incorrect or uneven	c. Adjust suitably.
d. The ball joints may be worn out.	d. Replace with a new one

Leaf springs are formed by bending. They are made of long strips of steel. Each strip is named as Leaf. The long leaf is called Master Leaf, and it consists of eyes at its both ends. One end is fixed to the chassis frame, the other end is fixed to the shackle spring. The spring will get elongated during expansion and shortened during compression. This change in length of spring is compensated by the shackle. The U-bolt and clamps are located at the intermediate position of the spring. The bronze or rubber bushes are provided on both eyes on the master leaf.

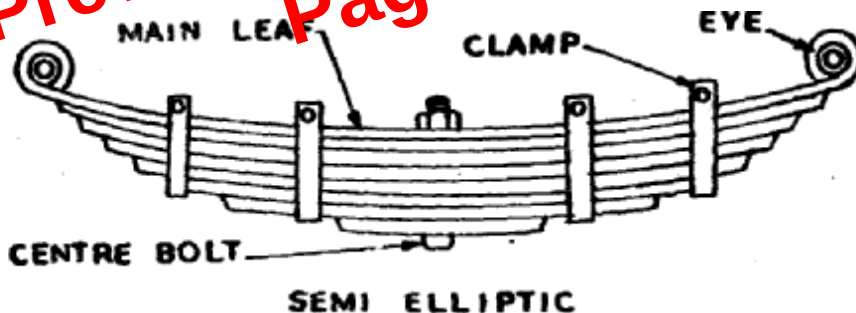
Types of Leaf Springs: There are five types of leaf springs

1. Full – elliptic type
2. Semi – elliptic type
3. Three Quarter – elliptic type
4. Transverse Spring type
5. Helper Spring type

1. Full elliptic :

The advantage of this type is the elimination of shackle and spring. The lubrication and wear frequently which are on of the main drawback of this type of springs.

2. Semi – elliptic



This type is more popular for rear suspension are used in 75% of cars.

3. Three – Quarter – elliptic type:

This type is rarely used in now-a-days. It gives resistance, but occupies more space than other types.

4. Transverse Type:

This type of spring is arrange transversely across the car instead of longitudinal direction. The transverse spring for front axle as shown in figure,

which is bolted rigidly to the frame at the center and attached to the axle by means of shackle at both ends.

5. Helper Springs:

The helper springs are used in heavy vehicles for rear suspension. When vehicle fully loaded the main spring as well as helper spring to come in action and absorb the road shocks. When the load of the vehicle is less the helper spring will not act and the main spring only absorb the road shocks.

Need of Shock Absorber: If the suspension springs are rigid enough, they will not absorb road shocks efficiently, and if they are flexible enough, they will continue to vibrate for longer time even after the bump has passed. Therefore, the springing device must be compromise flexibility and stiffness a shock absorber needed in Automobile Suspension system.

Types of Shock Absorbers: They are mainly two types

1. Mechanical.
2. Hydraulic –
 - a. Van type
 - b. Piston – i) Single Acting ii). Double Acting
 - c. Telescopic type

Construction and Working of Single acting Telescopic hydraulic shock absorbers:

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Working: If the axle eye moves upwards then the fluid must be displaced from the bottom. Top side of the bottom side fluid through the outer ring of the piston by lifting the non return valve. But since the increase in the volume of upper end of the cylinder is less than the volume of the lower end. Fluid will also be displaced through the inner ring of holes of non return valve of foot valve, and the level at the fluid will raise in the reservoir. The pressure setup will depend on the size of hole in the piston and Foot valve and the square of the speed of which the cylinder is moved.

For downward motion of the cylinder the fluid will be displaced from the upper end of the piston. In the lower end through the inner ring of hole of non return valve in the piston. The fluid will also be drawn in the lower end of the cylinder from the reservoir to the outer ring of hole of non return valve of the foot valve.

Fig of shock absorber

Stabilizer Bar:

Stabilizer is necessarily used in all independent front suspension. It reduces tendency of the vehicle to roll on either side when taking a turn. It is simply a bar of alloy steel with arms at each end connected to the lower wish bone of the independent suspension system. It is supported in bush bearings fixed to the frame and is parallel to cross member. When both the wheels deflect up or down by the same amount, the stabilizer bar simply turns in the bearings. When only one wheel deflects, then only one end of the stabilizer moves, thus it acts as a spring between two sides of the independent front suspension.

Torsion Bar

Torsion bar suspension is used in independent suspension system. It is a rod acting in torsion and taking shear stresses only. It is made up of heat treated alloy spring steel. This bar stores amount of energy nearly as same as coil spring.

The bar is fixed at one end to the frame, while the other end is fixed to the end of the wheel arm and supported in the bearing. The other end of the wheel arm connected to the wheel hub. When the wheel strikes a bump, it starts vibrating up and down, thus exerting torque on the torsion bar which acts as a spring.

Short Answer Questions

1. Explain the functions of suspension system?
2. List out the requirements of suspension system?
3. What are the types of suspension springs?
4. what are the basis suspension movements?
5. Explain about sprung weight and un sprung weight?

Long Answer Questions

1. What are the types of Independent suspension system and explain about wish bone type of front independent suspension?
2. What are the types of leaf spring used in automobiles and explain with neat sketches?
3. Explain the construction and working of single acting, telescopic, hydraulic shock absorber with a neat sketch?
4. Explain briefly about following contents:
 - a. stabilizer bar
 - b. Torsion bar

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Short Answer Questions :

1.What is the necessity of automobile air-conditioning?

Long Answer Questions:

1. Write the construction and working of automobile Air-conditioning system with a line diagram?

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