

Ajay Kumar Garg Engineering College, Ghaziabad

Department of ME

Sessional Test-2 (Question Paper Solution)

Course: B. Tech
 Session: 2017-18
 Subject: Automobile Engineering
 Max Marks: 50

Semester: VII
 Section: ME-1, ME-2, ME-3
 Sub. Code: NME-702
 Time: 2 hour

Section-A

Q1. What is the function of universal coupling?

Ans 1. An universal coupling also known as universal joint, is used to connect two shafts which are inclined to each other and whose axes are intersecting. Universal joints are designed to transmit torque under various loadings and when angle changes due to movement of drive shaft or drive axles during the vehicle operation.

Q2. What do you mean by understeer and oversteer?

Ans 2. While negotiating a curve, the vehicle must follow a well defined path under normal steering condition. But in actual practice the vehicle exhibits a tendency to take either a more sharp turn than intended by the driver or a lesser turning. The former situation is called oversteer and the latter is known as understeer.

Q3. What is the function of wheel cylinder?

Ans 3. A wheel cylinder is a component in a drum brake system. It is located in each wheel and is usually positioned at the top of the wheel, above the shoes. Its function is to exert force onto the shoes so as to bring

them into contact with the drum and stop the vehicle with friction.

Q4. List the general requirements of a good clutch?

Ans4. While discharging its functions, the following are desirable requirements in a clutch.

- (i) A clutch should engage gradually without undesired jerks.
- (ii) The operation of clutch disengagement should be effortless.
- (iii) The size of the clutch should be such that it occupies minimum space.
- (iv) The rotating parts of clutch should have least inertia i.e. min. mass.

Q5. What is the function of the frame in an automobile?

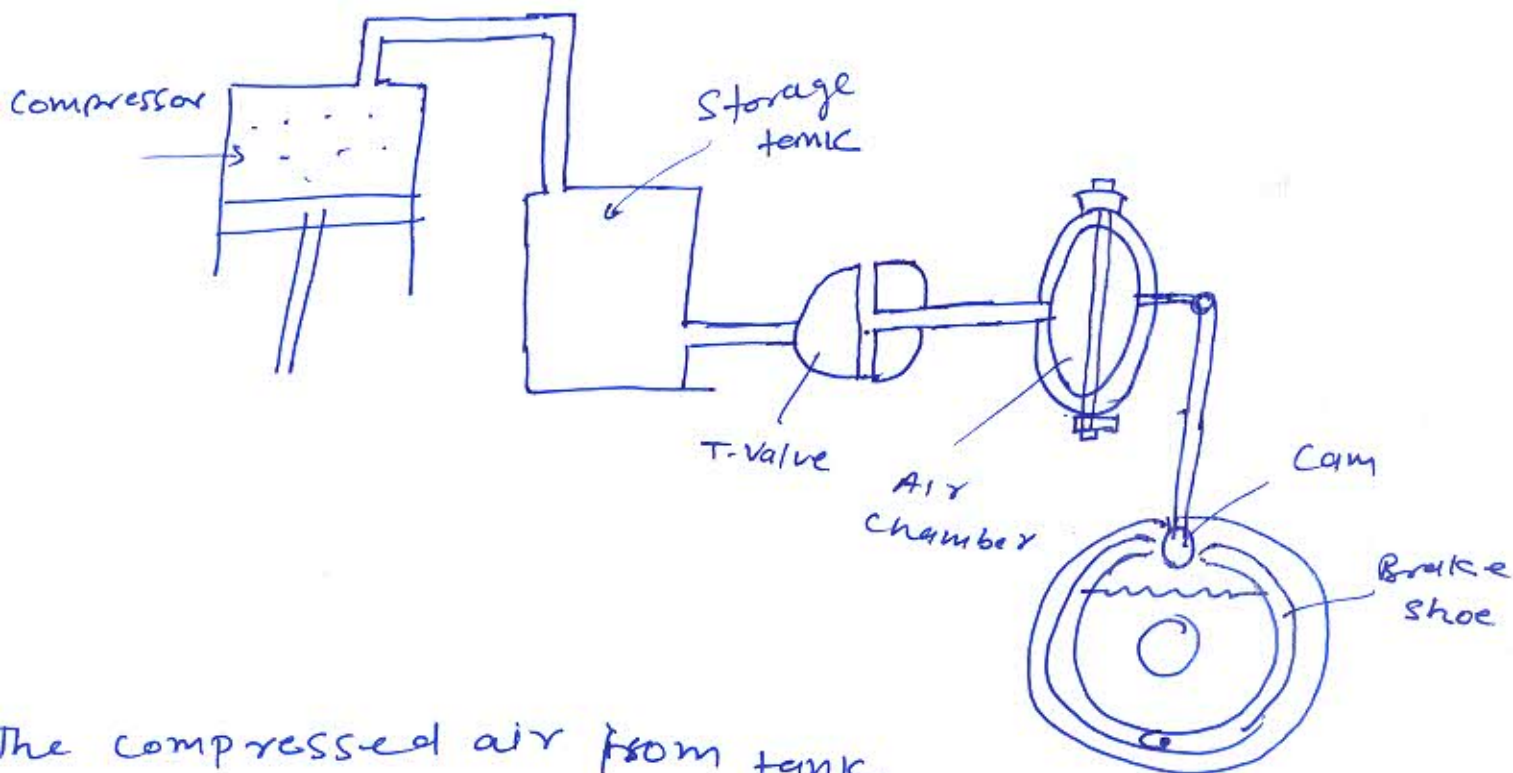
Ans5. The frame is an integral part of an automobile chassis. It supports power plant, transmission system, steering system, wheels and the tyres etc. The body is also fitted on it.

Attachments of all these parts may be rigid or flexible. Rigid attachment is due to welding while flexible attachments utilize fertilizers.

Section B

Q.6 Discuss the air braking system with neat sketch. state the advantages of it.

Ans:- The air brakes are generally used on heavy vehicles as buses, trucks and highway vehicles. In air brakes, compressed air is used to apply the braking force to the brake shoes. Thus considerable force is available for braking since operating air pressure may be high as about 900 kPa.



The compressed air from tank passes through a T-valve then it goes to the air chamber, where it compresses the diaphragm and diaphragm is pushed to the right. This is linked to the push rod that operates the brake cam. When the cam rotates, the brake shoes expand. The brake is thus applied.

Advantages :-

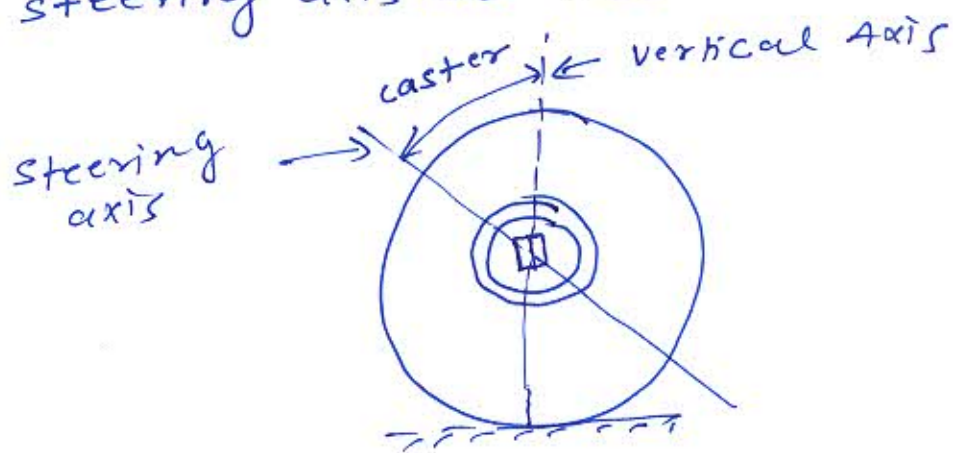
- (1) More safer than hydraulic Brakes
- (2) Air Brakes are much more reliable than hydraulic Brakes
- (3) Less costly than hydraulic Brakes
- (4) More safer than others.

Q.8 :- ~~what is overdrive? Explain its co~~

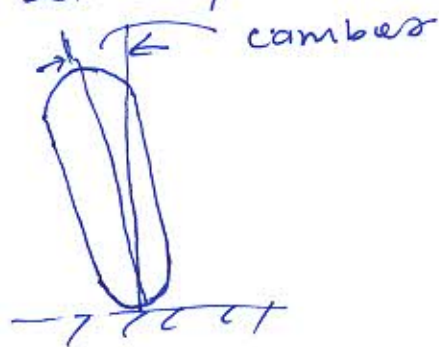
Q.7 Explain terms:

(i) Caster (ii) Toe-in and toe-out (iii) Camber

Caster :- The Caster is an angle between wheel's steering axis and the vertical axis

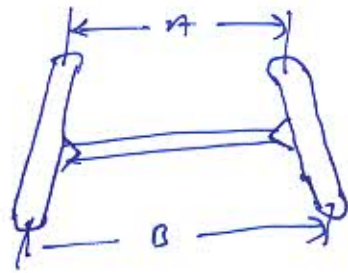


Camber :- It is the angle b/w vertical line and wheel central line, when viewed from the front.



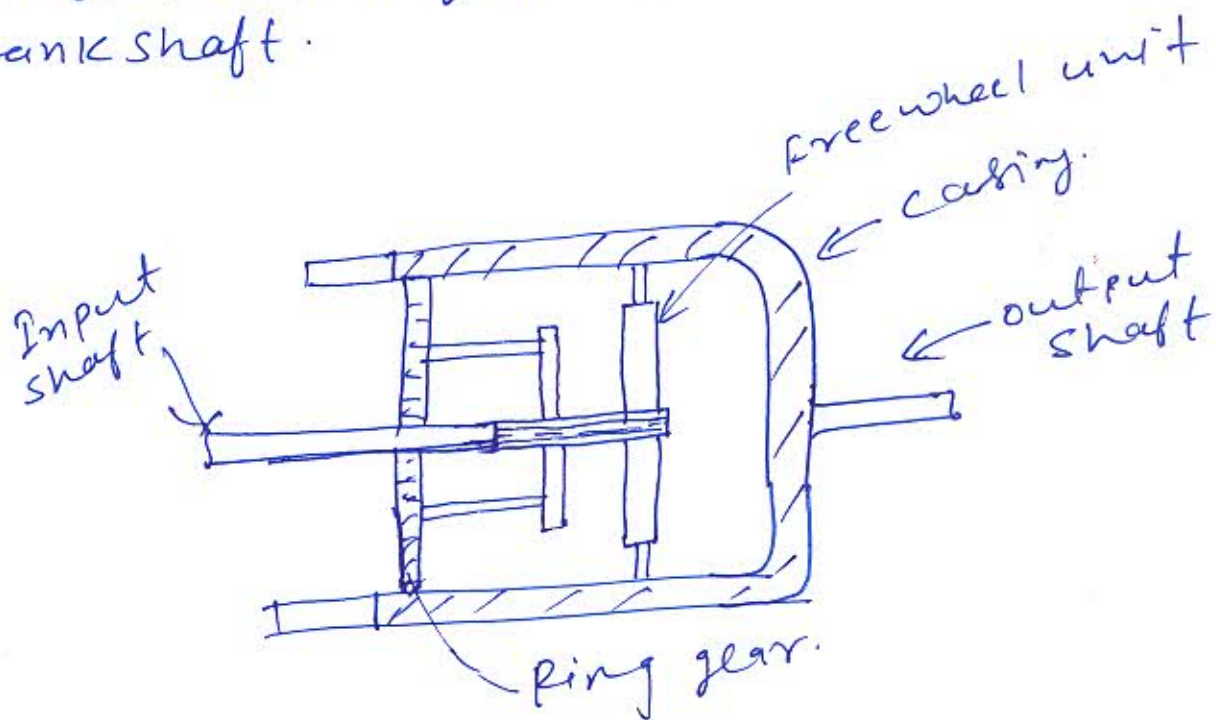
Toe-in and toe-out:-

The toe-in is the pointing of the wheels inward at the front and toe-out is the pointing of wheel toward out.



Q.8 What is overdrive? Explain its construction and discuss its working briefly.

Ans:- Over drive is a device fitted between the transmission and the propeller shaft and is used to provide a gear ratio of more than 1:1 this means that the overdrive causes the propeller shaft to turn faster than the speed of engine crankshaft.



It consists of Planetary or epicyclic gear train in which the sun gear is free to rotate on the output shaft, while the planet carrier can move on splines of the shaft. The input shaft also carries the flywheel unit is connected to output shaft through casing. When input shaft is rotated then the output ^{put} shaft has more rotation than input shaft.

Q.9 what is the function of a clutch? Discuss various factors affecting torque transmission in a clutch.

A clutch is a mechanical device which engages and disengages power ~~transmission~~ transmission especially from driving shaft to driven shaft. In a simplest application clutches connect and disconnect two rotating shafts.

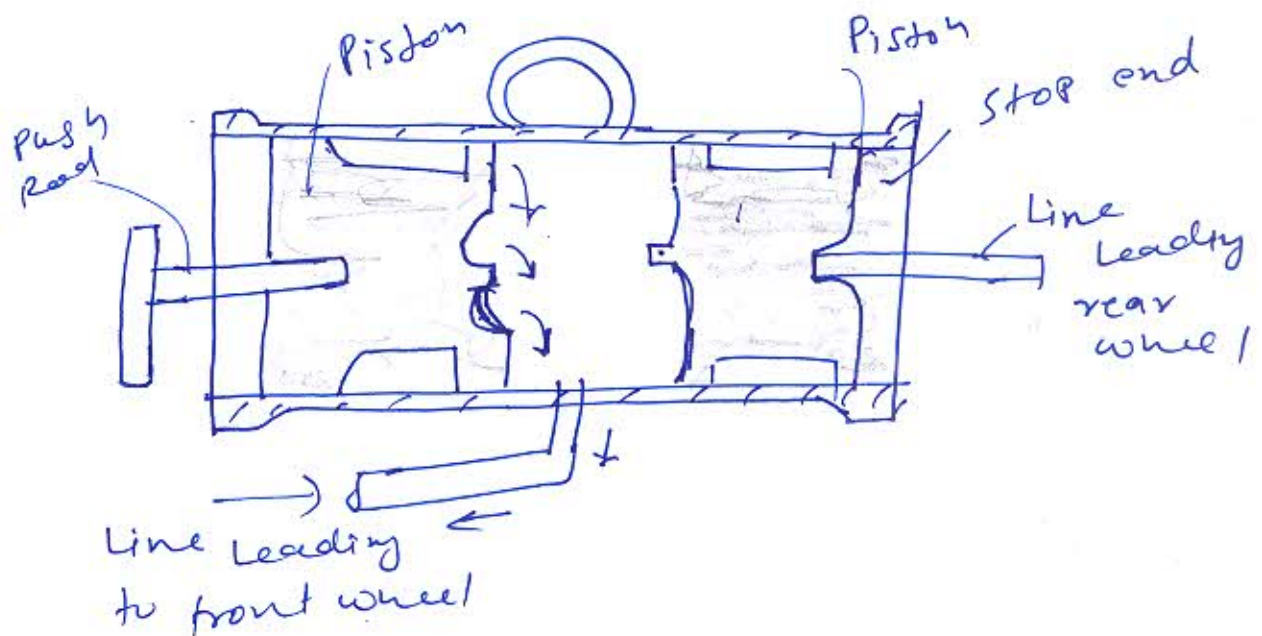
Factors affecting Torque transmission: -

- (1) Co-efficient of friction in clutch material
- (2) Axial pressure (w)

The maximum value of w is limited about 100-120 N and allowable pressure is 130-200 kPa.

(3) Mean Effective Radius of the contact surface
The value of R cannot be increased beyond a certain maximum value, which depends upon the space available.

Q.10 Describe the function of master cylinder with neat sketch?



Functions: -

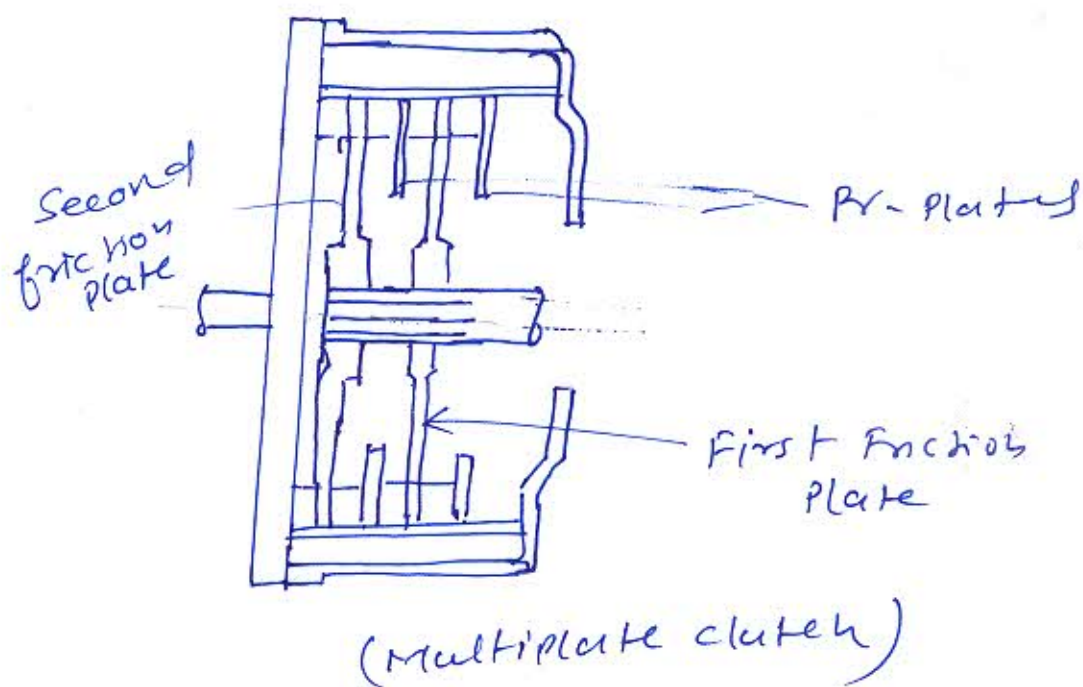
- ① It converts the pressure applied to the brakes into hydraulic pressure
- ② It maintains a constant volume of the fluid in the brake line since it has a reservoir
- ③ The reservoir cap of the master cylinder is provided with a float sensor, which alerts the driver, when the level of the brake fluid in the reservoir dropped

Below the predefined ~~low~~ level.

Section - C

Q. 15 Explain the multiplate friction clutch with neat diagram.

A multiplate clutch is provided with more than one friction plate. In fact in this clutch there are two pressure plates and two friction plates.



while the fly wheel is rotating, the pressure plates rotate and press against the friction plate, this causes the friction plates

and thus the clutch shaft to rotate as well when pedal is pressed, the flywheel continues to rotate but the friction plates are released. this happens because they are not fully pressed by the pressure plates. thus the clutch shaft also stops rotating.

Advantages:-

- (1) Increase the capacity of clutch.
- (2) used in some heavy vehicles.
- (3) can be used where there is limited space is available.

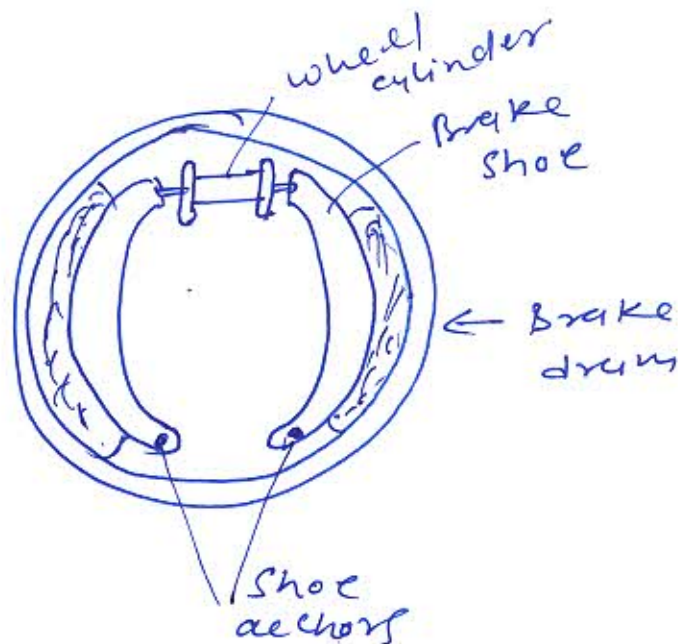
Q.12 write short notes on the following
(i) Drum Brakes
(ii) Torque converter

Ans:- Drum Brake

A drum brake system consists of a pan shaped drum, two brake shoes, a backing plate and wheel cylinder or an operating cam. The drum is attached to the axle or hub flange, just inside the wheel.

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The brake shoes are positioned just inside the drum and are mounted on the backing plate.



The braking force is transmitted from the shoes to the anchors, to the backing plate and then the suspension members.

When brake pedal is pressed and the brake shoes are pushed outwards so that the lining is forced against the drum.

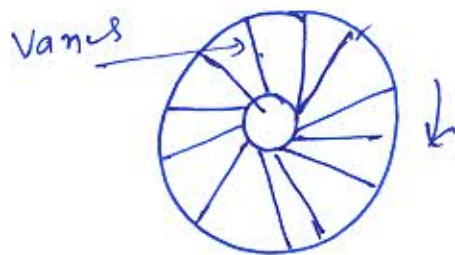
(ii) Torque converter :-

The torque converter is a type of fluid coupling with function to transfer power using automatic transmission fluid. The Torque converter is divided into three individual parts, i.e. the pump impeller, the turbine runner and the ~~stator~~ stator.

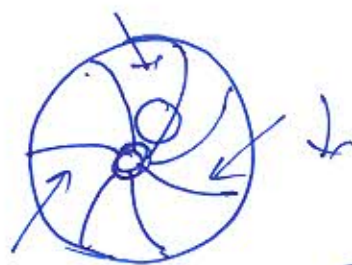
~~on comparing the actual torque~~

working:-

The fluid forced out from the pump impeller hits the blades of the turbine runner and drives the turbine round by the force of friction, in the same direction as the impeller. The fluid then flows b/w the blades, and when it is forced out of the turbine runner, its reaction force



Pump Impeller



Turbine Runner

makes the turbine runner rotates. This frictional and reaction force together makes up the rotational force of the turbine runner.