



WINTER -14 EXAMINATION
Model Answer

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Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more importance. (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgment on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

1. A) Attempt any SIX of the following :	12
i) Why is the Frame narrow at the front?	2
Answer: The Frame is narrow at the front- 1. to have a better steering lock. 2. it gives smaller turning circle radius.	2
ii) What are the loads acting on the chassis Frame?	2
Answer: Loads acting on the chassis Frame (<i>any four points- 1/2 mark each</i>) 1. Statics Loads – Loads due to chassis parts, weight of vehicle and passengers. 2. Vertical loads when vehicle comes across a bump or hollow. 3. Inertia Loads – while applying brakes 4. Impact loads – Due to collision of vehicles. 5. Momentary duration Loads- while taking a turn.	2
iii) State the function of the Frame.	2
Answer: Function of the Frame 1. To support the body and chassis components such as engine, gear box, axles, suspension system, braking system etc. 2. To withstand different types of loads acting on it.	2
iv) State the materials for clutch lining.	2
Answer: The materials for clutch lining are: (<i>any four materials- 1/2 mark each</i>) 1. Leather 2. Cork 3. Fabric 4. Asbestos 5. Reybestos and Ferodo 6. Non- asbestos clutch lining material.	2



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v) State the type of Gear Boxes.	2
Answer: Type of Gear Boxes: 1. Sliding mesh gear box 2. Constant mesh gear box 3. Synchromesh gear box. 4. Epicyclic / automatic gear box.	2
vi) Why hollow propeller shaft is used for transmission?	2
Answer: In Hotchkiss type rear axle drive, hollow propeller shaft is used- (<i>Any two points</i>) 1. It decreases inertia which would increase its acceleration and deceleration. 2. It withstand maximum bending stresses as compare to solid shaft. 3. It has less weight, so less chances of sagging.	2
vii) What is function of differential gears?	2
Answer: Function of differential gears: (<i>Any two points</i>) 1. To transmit the torque at right angle in equal proportion when vehicle moves straight ahead. 2. To differentiate the speed of road wheels while taking a turn. 3. Equal distribution of torque in all running situations.	2
viii) What is differential lock?	
Answer: Differential lock: If one of the rear wheel lying on soft mud or loose dirt and sand, while the other is on the solid ground. At that time, the wheel which is on soft mud are having less resistance. The wheel lying on soft ground spins or rotate around its own axis due to differential action, while the wheel on the solid ground is not driven and remains stationary. When the differential locking is applied, the differential action is stopped and the whole torque is then applied to the wheel which is gripping on the road.	2
b) Attempt any TWO of the following :	8
i) Classify vehicle layout with respect to: 1) Location of engine. 2) No. of live axles 3) Arrangement of engine 4) Application	4
Answer: Classification of vehicle layout with respect to: 1. According to location of Engine a) Front Engine Rear Wheel Drive b) Front Engine Front wheel Drive c) Mid Engine Rear wheel Drive d) Rear Engine Rear Wheel Drive 2. According to no. of live axles: a) Two Wheel Drive vehicle - only one front or rear axle is live axle. b) Four Wheel Drive vehicle - both front and rear axle are live axle. 3. According to arrangement of Engine a) Logitudinally placed engine b) Transversely placed engine 4. According to Application. a) Light Motor Vehicle - e.g. Car Jeep, b) Heavy Motor Vehicle - e.g Truck, Bus, Commercial or Goods carrier vehicle	1 1 1 1

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ii) Draw neat labeled sketch of clutch used in heavy vehicle.

4

Answer: single plate dry type clutch is used in heavy vehicles. (Equal credit should be given to Diaphragm type clutch)

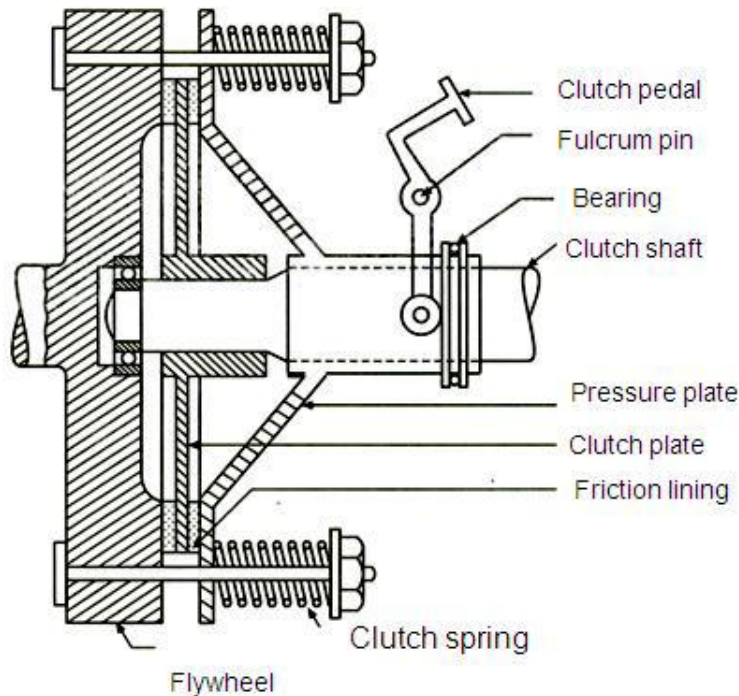


Fig: Single Plate Clutch

4

iii) State two applications of multi plate clutch and centrifugal clutch.

4

Answer:

Application of Multi plate Clutch

1. Multi plate wet clutch used in Two-Wheeler where space is limited
2. It is also used in racing cars where torque transmission criteria is maximum.
3. It is used in Heavy Transport vehicles and special purpose vehicles.

2

Application centrifugal clutch

1. Use in Automatic transmission vehicles like mopeds.
2. Use in semi-automatic transmission vehicles like Cars.

2

2. Attempt any FOUR of the following :

16

a) Compare between dry clutch and wet clutch on the basis of construction, torque transmission, heat dissipation and application.

4

Answer:

	Dry Clutch	Wet Clutch
Construction	Clutch plates are always dry not immersed in oil.	Clutch plates always wetted by oil circulation and material used for friction material is also different.
Torque Transmission	Torque transmission is maximum due to more frictional area in contact.	Due to lower coefficient of friction lower torque transmission capacity .
Heat Dissipation	Slow rate of heat dissipation as heat is transferred from metal to air.	High rate of heat dissipation as heat is transferred from metal to oil.
Application	E.g. Heavy Transport vehicle, light motor vehicle etc.	E.g. - Special Purpose vehicles and two wheelers, racing cars etc.

4

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b) Explain construction and working of clutch plate with neat sketch.

4

Answer:

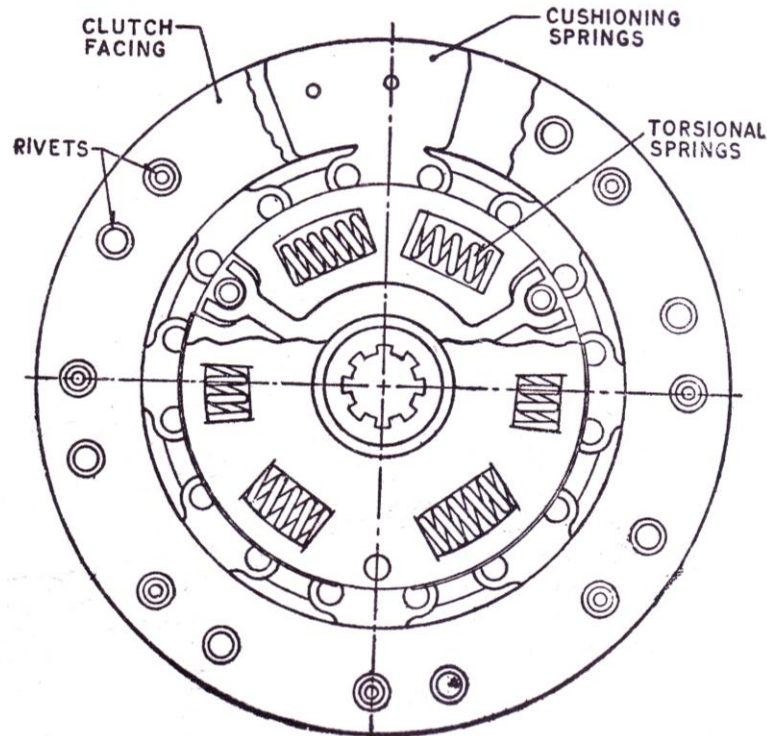


Fig: Clutch Plate

2

Construction-

It consist of steel plate with a splined central hub. Annular friction facing are attached to the steel plates by rivets. Special resins are also used to bind the friction facing. The curved cushioning spring segments are attached rigidly to the centre plate and friction facing are riveted to these springs. Centre hub-assembly consists of a splined hub with radially placed slots in the flange of the hub. There are similar type of slots in each of the two plates situated on either side of the hub flange.

1

Working-

On engagement the load applied first compress the spring segments to the flat condition, resulting in greater degree of clutch control and therefore smoother engagement. Longer life is obtained because the friction materials contacts the pressure plate and flywheel under more uniform pressure, thereby allowing uniform heat generation over the entire friction surface.

1

c) Explain hydraulic clutch operation mechanism with help of block diagram.

4

Answer:

Operation of hydraulic clutch mechanism -

When the clutch pedal is pressed fluid under pressure from the master cylinder reaches the slave cylinder which is mounted on clutch itself. The fluid under pressure actuates slave cylinder push rod and plunger permits the seal spring to press the valve shank and seal against its seat. This disconnect the cylinder from the reservoir . Further movement of the plunger displaces the fluid through the pipelines to the slave cylinder and disengage the clutch.

2

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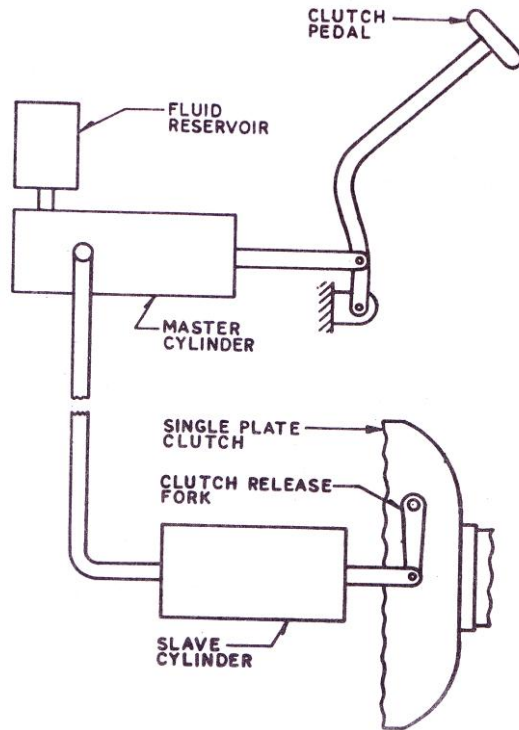


Fig: Hydraulically operated clutch.

d) Explain construction and working of fluid coupling with neat sketch.

Answer:

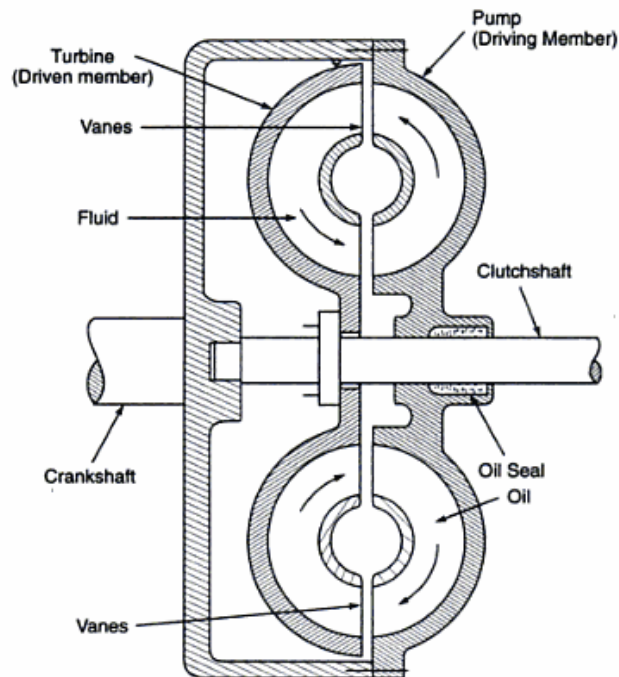


Fig. Fluid Coupling

Construction-

It consists of the driving and driven as shown in above fig. The driving member is attached to the engine flywheel and driven member, to the transmission shaft. The member do not have direct contact with each other

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Working-

When engine crank fluid from driving member rotor blade is pushed towards the driven member rotor blades so that it applied the pressure on the driven member rotor blade. As speed of driving member increase gradually speed of driven members also increases.

1

e) Explain construction and working of clutch used in two wheeler vehicle.

Answer: In two wheeler **Multi plate wet** clutch is used.

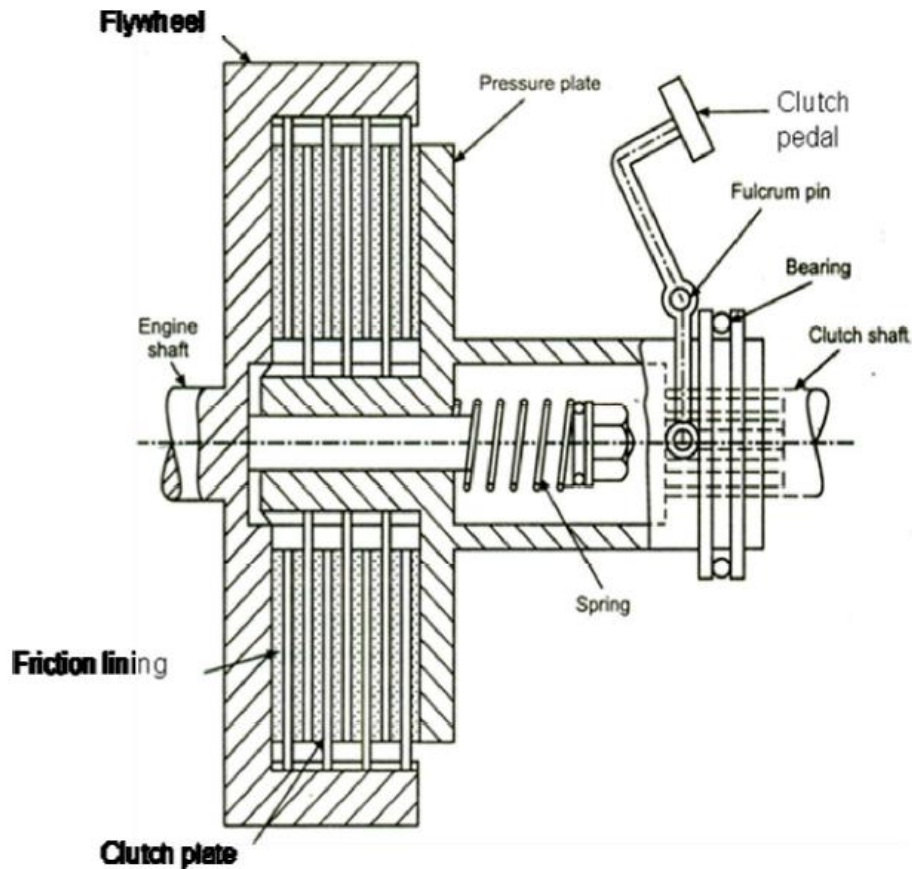


Fig: Multiplate Clutch

2

Construction-

Multiplate clutch provided with more than one friction plate. In this clutch there are number of pressure plates and friction plates. These pressure plates are linked to the clutch cover by means of studs. This clutch cover is fitted to the flywheel. One friction plate is placed between first and second pressure plate and the other one is between the second pressure plate and the one used in the single plate clutch. The two friction plates are connected to the clutch shafts by means of a spline arrangement.

1

Working-

While the flywheel 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 the pedal is pressed, the flywheel continues to rotate but the friction plates are released. This happens because they are not fully pressed by pressure plates. Thus the shaft also stops rotating.

1

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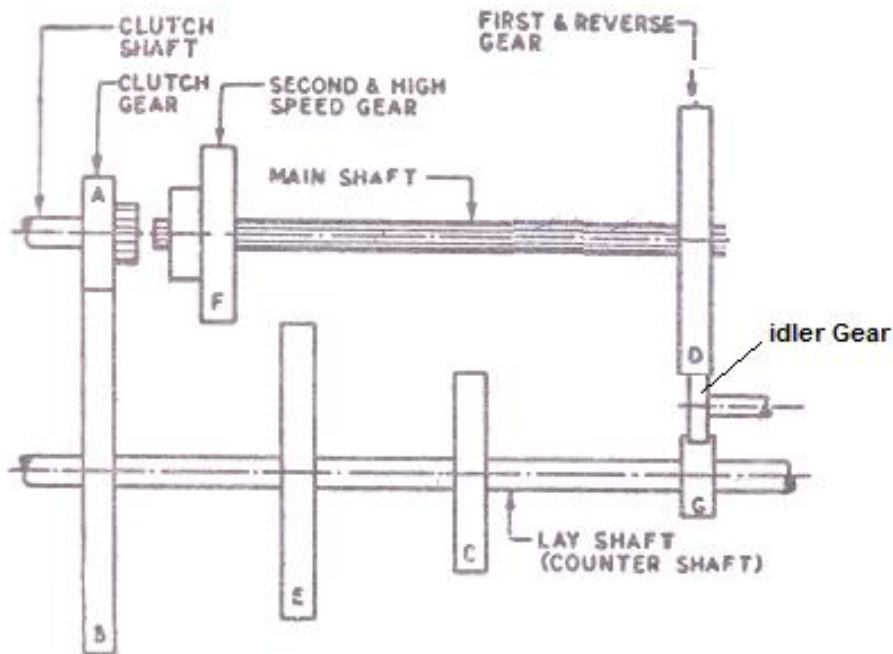
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f) Draw neat labeled sketch of sliding mesh gear box in reverse gear engaged position.

4

Answer:



4

Fig: Sliding mesh gear box in reverse gear engaged position

3. Attempt any FOUR of the following :

16

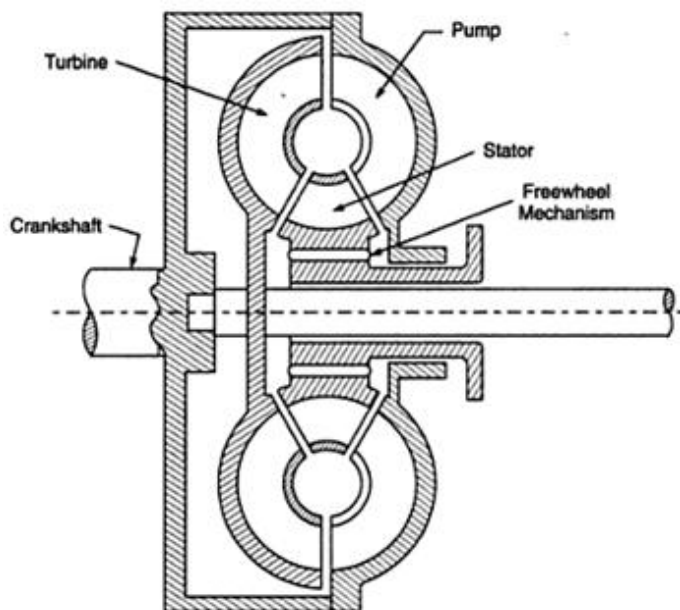
a) Explain with neat sketch contraction and working the torque converter.

4

Answer: The torque converter is modified form of fluid flywheel. Torque converter is used to transmit the power with varied torque as per the requirement.

It consists of following components

1. Driving member (impeller) - connected to the crankshaft,
2. Driven member (turbine) - connected to output shaft, and
3. Reaction member also (stator) - mounted on overrunning clutch on stationary component.



2

Fig: Torque converter

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Working

Converter starts operating when the impeller starts rotating, with the engine providing the required input. The impeller creates a centrifugal pumping head or vortex flow. At the same time, the fluid must follow the rotational inertia or the effort of the impeller. These two fluid forces combine to produce a resultant force in the form of an accelerated jet stream against the turbine vanes. The impeller and turbine attempts to act as an effective fluid coupling. The turbine vanes reverse the fluid direction. The curved turbine vanes provide efficient energy transfer, but the reentry of the remaining fluid thrust back to the impeller, works against the impeller and crankshaft direction. Hence, it is necessary to introduce the stator element to make the converter work. The stator is employed between the turbine, outflow and impeller inflow to reverse the direction of the fluid and make it flow in the same direction as that of the impeller. Instead of the fluid opposing the impeller, the fluid energy now assists the impeller and crankshaft rotation. This results in boosting the rpm of the impeller. This allows the impeller to accelerate more and recycle the fluid with a greater thrust against the turbine vanes.

2

b) Explain with sketch synchromesh device used in gear box.

4

Answer: (credit should be given to any suitable diagram / sketch)

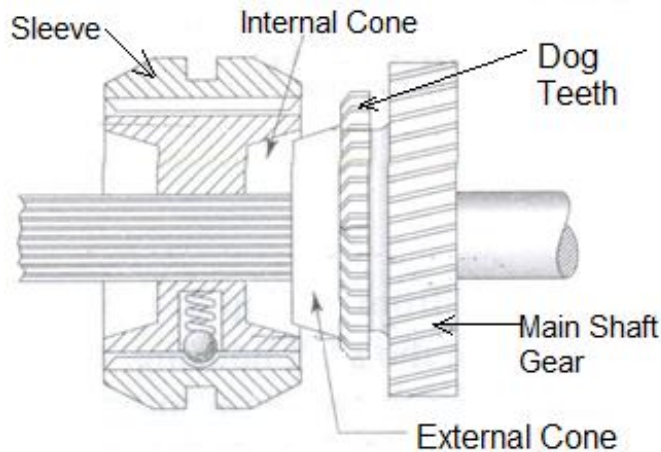


Fig - synchromesh device

2

By synchromesh device, the members which ultimately are to be engaged positively are first brought into frictional contact and then when the friction has equalized their speeds, the positive connection is made. Both the synchronizing device and the gear on the mainshaft have integral dog tooth portions. The synchronizing device have internal cone and the mainshaft gear have external cone. The synchronizing device is free to slide on splines on the mainshaft. The synchronizing device carries a sliding sleeve. In the neutral position, the sliding sleeve is held in place by the spring loaded balls which rest in the dents in the sliding sleeve (or ring gear). There are usually six of these balls.

2

While shifting gear, external cone and internal cone are first brought into frictional contact and then when speed gets equalized, the positive connection is made by simply sliding the sleeve to mesh with dog teeth on main shaft gear.

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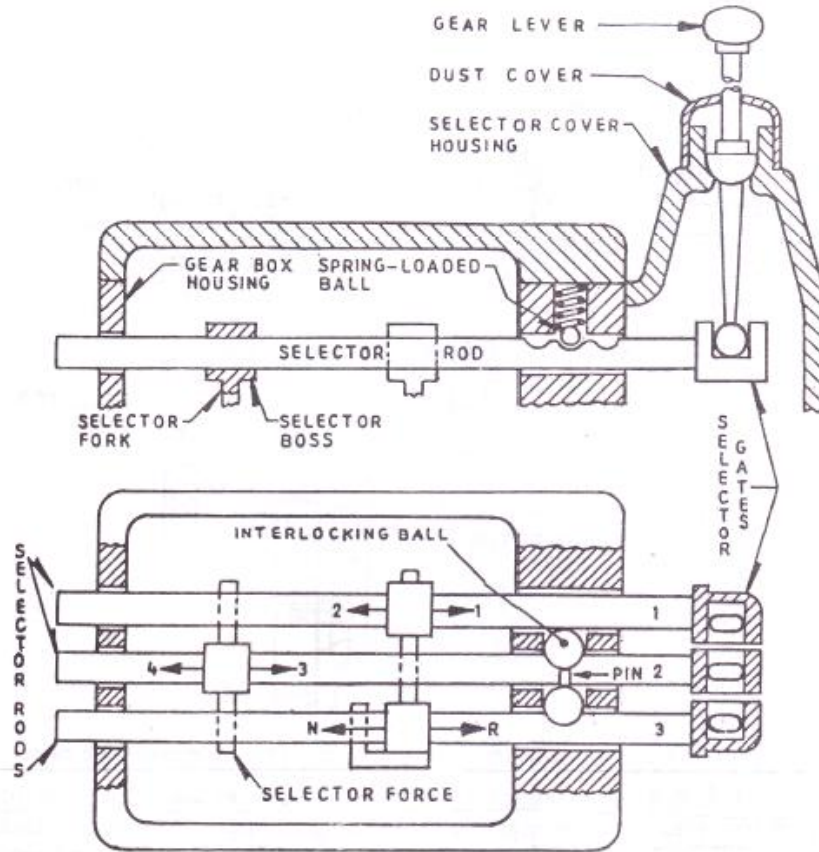
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c) Draw a labeled sketch of gear selector mechanism with gear lever on top of gear box

4

Answer: (Credit should be given to any other suitable diagram)



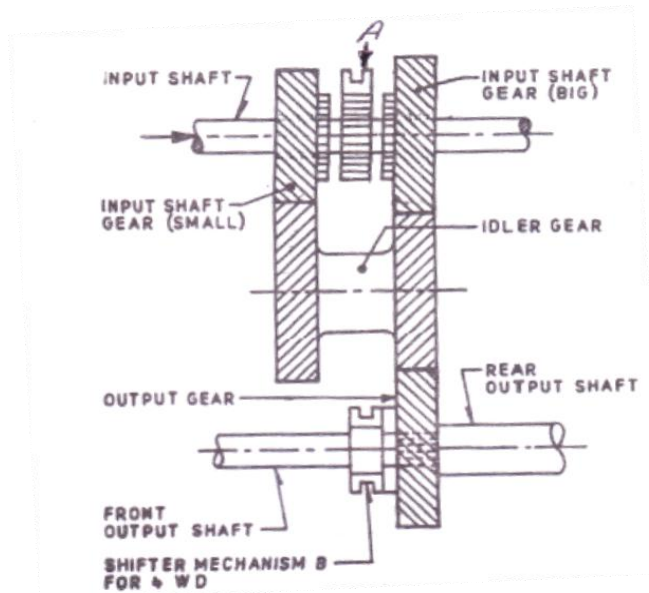
4

Fig - Selector mechanism with gear lever on top of gear box

d) Explain construction and working of transfer case with neat sketch.

4

Answer:



2

Fig - Transfer case

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Construction -

It consists of three shafts- input shaft, counter shaft and two output shafts. The input shaft takes power from the main gear box. The two gears gear1 and gear 2 on input shaft are free to rotate on it. These two input shaft gears have bosses on the inner side having axial teeth, which can be meshed with central member. The input shaft carries on central member C.M. having axial teeth on both, side faces. The gear G1 is smaller in diameter than G2.

1

Working

When the shifter-A is at the central position as shown in fig. here neither the gear G_1 and nor the gear G_2 is connected to the input shaft, it is known as neutral position. When the shifter-A connects the input shaft with big input gear G_2 , and the shifter-B disconnects the front output shaft from the rear output shaft. In this position, rear two wheel drives with the high gear is obtained.

1

Similarly when the shifter-A connects the input shaft with small input gear G_1 , and the shifter-B connects the front output shaft from the rear output shaft. In this position, four- wheel drive with the low gear is obtained.

e) What is double declutching? Explain.

4

Answer:

In constant mesh gearbox the driver has to disengage the clutch twice while shifting to the required gear, hence it is called as double declutching. Double de-clutching ensures smooth engagement and disengagement with reduced wear of dogteeth, less noise and vibrations

1

In constant mesh gear box, for smooth engagement of dog clutches it is necessary that the speed of main shaft and sliding dog clutch must be equal. To obtain lower gear, the speeds of the clutch shaft, lay shaft and main shaft must be increased. This is done by double declutching. The clutch is disengaged and the gear is brought to neutral. Then the clutch is engaged and accelerator pedal pressed to increase the speed of the main shaft gears. After this the clutch is again disengaged and the gear moved to the required lower gear and the clutch is again engaged. For changing to higher gear, however reverse effect is desired i.e., the driver has to wait the gear in neutral till the main shaft speed is decreased sufficiently for smooth engagement of the gear.

3

f) Explain Hotchkiss drive used in vehicle.

4

Answer:

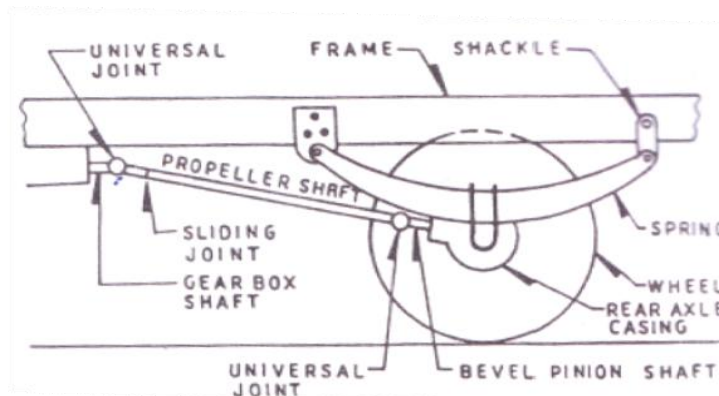


Fig - Hotchkiss drive

2

This drive is invented by Albert Hotchkiss. In the Hotchkiss drive two universal joints are used one at front and second at rear end of propeller shaft. Slip joint is used to accommodate change in length of propeller shaft. Leaf spring is shackled at the rear and bracketed at front end. Leaf spring takes Weight of body, driving thrust, side thrust, torque reaction and braking thrust. In the Hotchkiss drive, splines eliminate thrust transmitted back to the driveshaft from the wheels, allowing simple rear-axle positioning using parallel leaf springs. Due to torque reaction leaf spring deflects. It is used in heavy duty vehicles like bus and trucks.

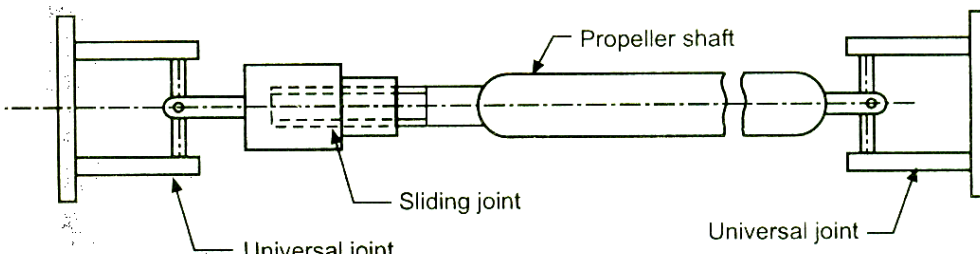
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<p>4. Attempt any FOUR of the following.</p>	<p>16</p>
<p>a) What is the difference between three speed and four speed gearbox? Where are these used?</p>	<p>4</p>
<p>Answer:</p> <p>In three speed gearbox 3 forward and 1 reverse gear ratios are obtained. While in four speed gearbox 4 forward and 1 reverse gear ratios are obtained. Four speed gearbox consist of one more dog clutch or synchromesh device than three speed gearbox. Since four speed gearbox gives more number of gear ratios it is preferred over three speed gearbox.</p> <p>Application -</p> <ol style="list-style-type: none"> 1. Three speed gearbox - three wheelers, old mopeds and scooters 2. Four speed gearbox - motor cycles, LMVs. 	<p>2</p> <p>2</p>
<p>b) Describe with neat sketch construction and working of propeller shaft.</p>	<p>4</p>
<p>Answer:</p>  <p style="text-align: center;">Fig - Propeller shaft</p> <p>Construction and Working -</p> <p>In an automobile, the shaft which transmits the power from the gearbox output shaft to final drive (differential) is called as a propeller shaft. The propeller shaft is normally tubular in section and of one or two-piece construction.</p> <p>It consists mainly of three parts :</p> <ol style="list-style-type: none"> Shaft: - As the shaft has to withstand mainly torsional loads, it is usually made of tubular cross-section. The shaft has to be well balanced to avoid whirling at high speeds. Shaft is made of steel, aluminium or composite materials. Slip joint: - Depending upon the type of the drive, one slip joint may be there in shaft. This serves to adjust the length of the propeller shaft when demanded by the rear axle movement. Slip joint is formed by the internal splines on the sleeve attached to the left universal joint and external splines on the propeller shaft. Universal joints: Depending upon the type of the rear axle one or two universal joints are used. The universal joints account for the up and down movements of the rear axle when the vehicle is running. 	<p>1</p> <p>3</p>
<p>c) Explain loads acting on rear axle ?</p>	<p>4</p>
<p>Answer: (any 4 loads)</p> <p>The rear live half axle shafts have to withstand following loads:</p> <ol style="list-style-type: none"> 1. Shearing force due to vehicle weight 2. Bending moment due to offset of vehicle load and road reaction 3. Side thrust during cornering 4. Bending moment due to Side thrust and support reaction. 5. Driving torque and torque reaction. <p>In all methods of axle supporting, the axle shaft has to take driving torque.</p>	<p>4</p>

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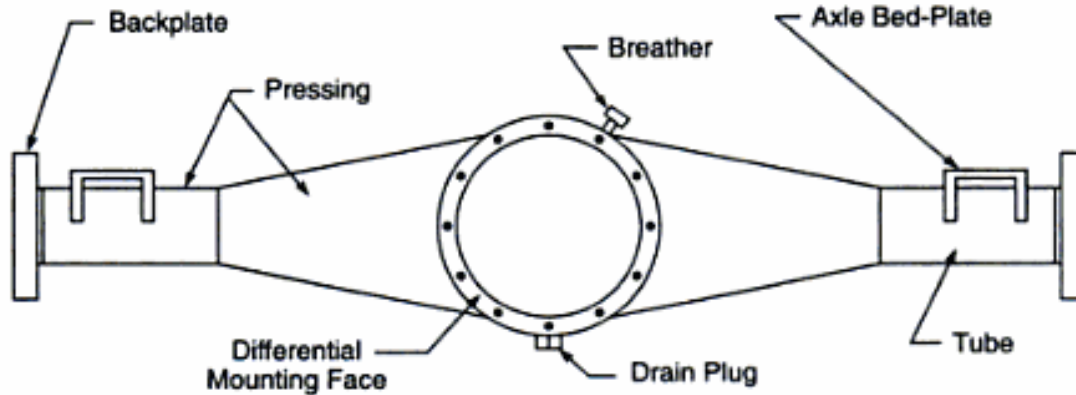
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d) Explain banjo type rear axle casing.

4

Answer:



2

Fig- Banjo type rear axle casing

It is named so, because its shape like the musical instrument banjo. This type of axle casing is one-piece and banjo shaped. The centre of the casing, combined with the axle tube on one side which looks like a banjo, hence called banjo casing.

2

The complete differential unit is carried in a separate carrier which is bolted to the axle casing. Therefore in case of any repair, the half shafts can be taken out directly from sides and the differential assembly removed by opening bolts only. A lubricant level plug, set at a height about one third up the crown wheel, is screwed into the domed cover.

e) What is the tyre rotation procedure for heavy vehicles? Explain it with a neat sketch.

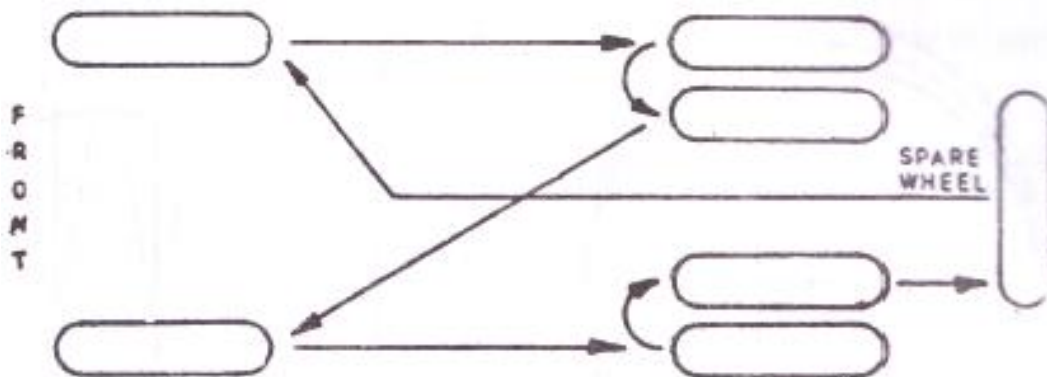
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Answer: **Tyre rotation procedure for heavy vehicles**

It is procedure adopted for changing the position of tyres with respect to each other after fixed intervals of operation is called as tyre rotation. In order that all the tyres wear uniformly, it is recommended that the tyres be rotated after fixed intervals of operation. Generally tyres are rotated after every 8000 km.

2

In heavy vehicles Front tyres are brought at rear and rear outer tyres are shifted to inner side. Inner left tyre is brought to spare wheel position. Spare wheel is brought to right front side tyre and rear right side inner tyre is placed to left front wheel position. Proper tyre rotation saves total cost of tyre by ensuring uniform tyre wear.



2

Fig- Tyre rotation for Heavy Vehicles

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f) Explain disc type wheels with neat sketch.

4

Answer:

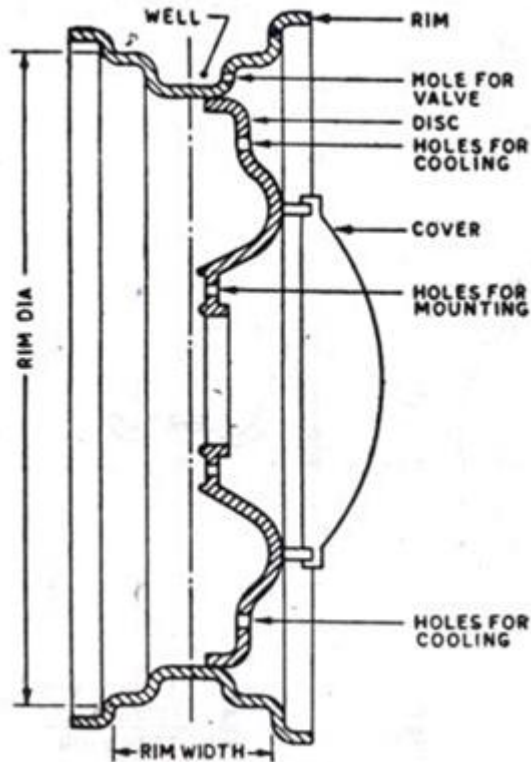


Fig- Disc type wheels

Disc type of wheel consists of two parts, a **steel rim** which is generally well-based to receive the tyre & a **pressed steel disc**. The rim & the disc may be integral, permanently attached or attachable, depending upon design. In disc wheel the pressed steel disc is welded to the rim. When the bead of the tyre is resting in the well, it is possible to pass the tyre over the possible edge of the rim. Without the **well** it would not be possible to mount or remove the tyre from the wheel. The seat of the rim where the tyre rests usually has a 5° or 15° taper so that the tyre is inflated; the beads are forced up the taper to give a wedge fit. With tubeless tyres, the taper helps to make a good seal. Some slots are provided in the wheel disc to allow the air to the inner side for better cooling of the brake drum inside. A separate cover is also provided on the wheel disc. A hole in the rim serves to accommodate tube valve.

2

2

5. Attempt any TWO of the following :

16

a) State and explain type of constant velocity joints with neat sketch

08

Answer: (equal credit should be given to any suitable diagram & any other type of joint)

CV joints are sliding or plunging joints. They move in and out to change effective length of the half shafts. There are two types of CV joints,

2

1. Rzeppa or double offset CV joint
2. Tripod CV joint.

1. Rzeppa joint (2Marks foe Description & 2 Marks for Figure)

A Rzeppa joint consist of a spherical inner with 6 grooves in it, and a similar enveloping outer shell. Each groove guides one ball. The input shaft fits in the center of a large, steel, star-shaped "gear" that nest inside a circular cage. The cage is spherical but with ends open, and it typically has six openings around the perimeter. This cage and gear fit into a grooved cup that has a splined and threaded shaft attached to it. Six large steel balls sit inside the cup grooves and fit into the cage openings, nestled in the grooves of the star gear.

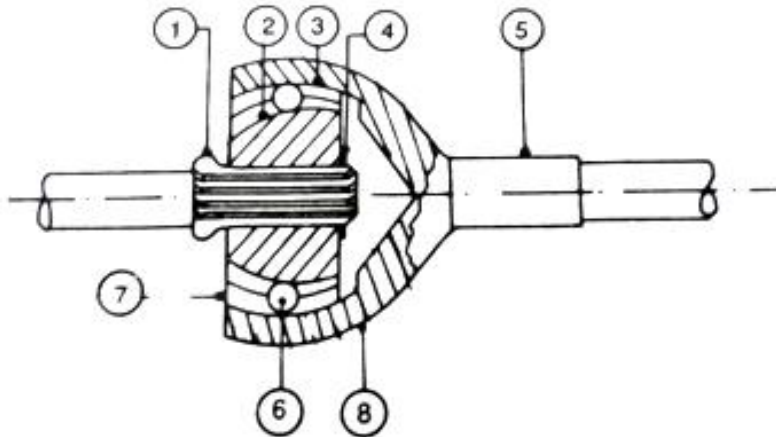
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- | | |
|-----------------------------|-----------------------------|
| 1. Half shaft (input shaft) | 2. Spherical socket (inner) |
| 3. Spherical socket (outer) | 4. Circlip |
| 5. Output shaft | 6. Ball |
| 7. Bearing cage | |

Fig- Rzeppa Joint

2. Tripod joint:

These joints are used at the inboard end of car drive shafts. This joint has a three-pointed yoke attached to the shaft, which has barrel-shaped roller bearings on the ends. These fit into a cup with three matching grooves, attached to the differential. Since there is only significant movement in one axis, this simple arrangement works well. These also allow an axial 'plunge' movement of the shaft, so that engine rocking and other effects do not preload the bearings. A typical Tripod joint has up to 50 mm of plunge travel, and 26 degrees of angular articulation.

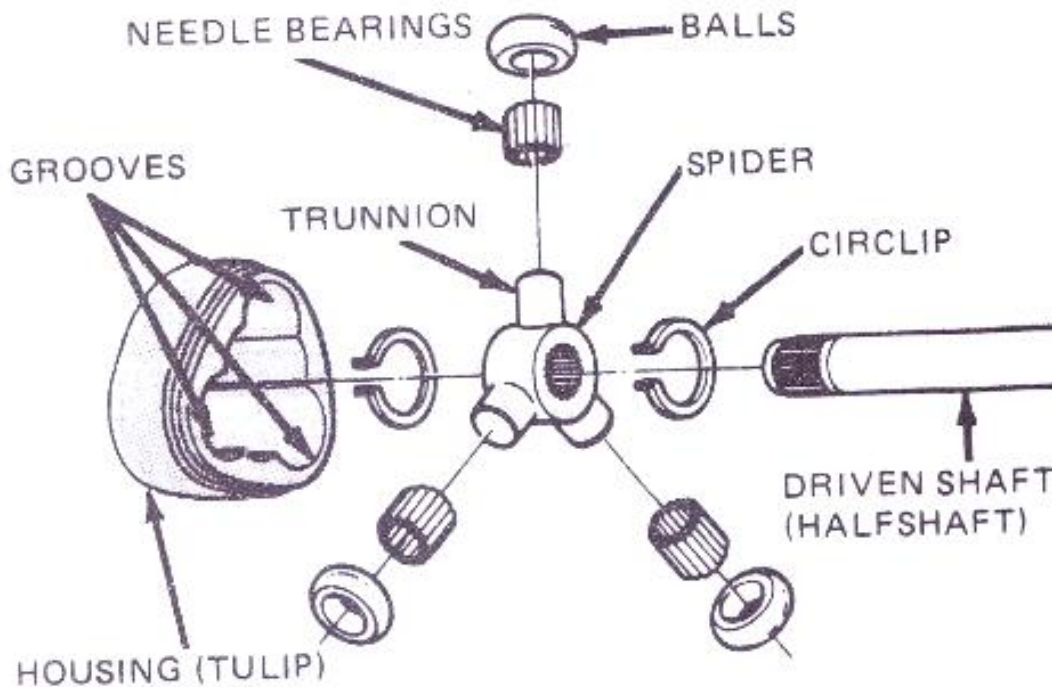


Fig- Tripod Joint

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b) Explain construction and working of differential with neat sketch.

08

Answer:

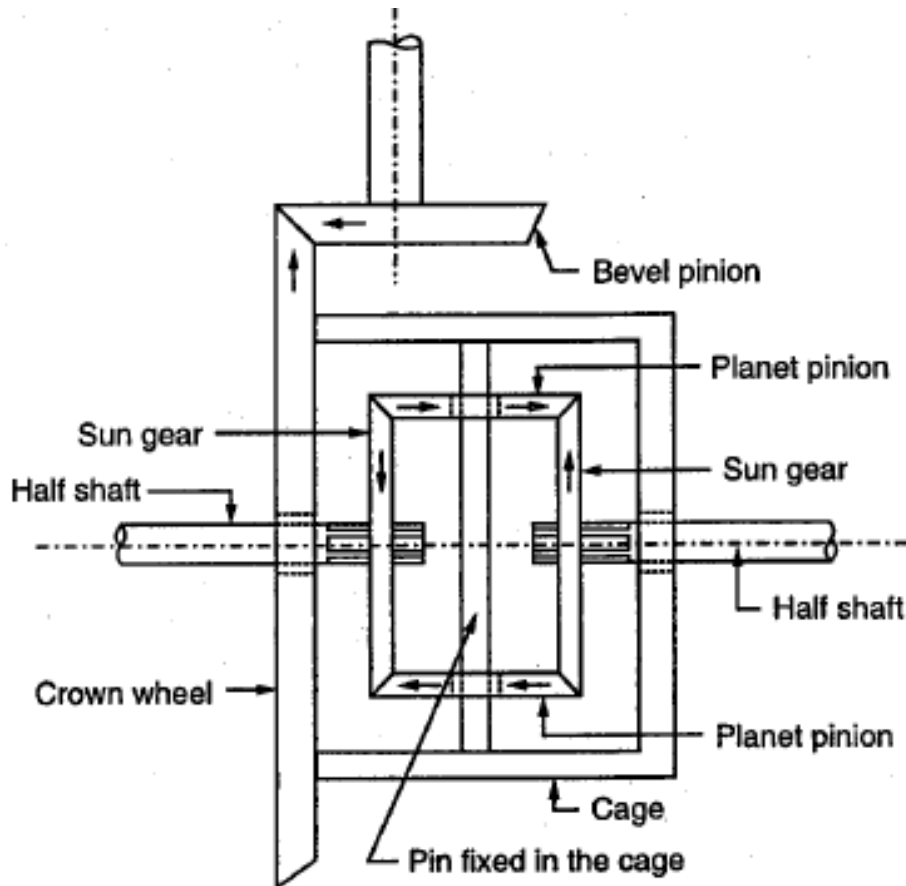


Fig- working of differential

3

Construction:

It consists of a cage, which is bolted to the inner side of the crown wheel and rotates with it. The two planet pinions are mounted upon a spider shaft and are in mesh with two sun gears which support and drive the inner end of the half shafts.

Working:

Vehicle Running Straight:-

When vehicle moves in a straight line, the power comes from propeller shaft to the bevel pinion which drives the crown wheel. Then it is carried to the differential cage in which a set of planet pinions and sun gears are located. From the sun gear it is transmitted to the road wheels through axle half shafts. In this case, the crown wheel, differential cage, planet pinions and sun gears all turn as a single unit and there is no any relative motion between the sun gear and planet pinion. The planet pinions do not rotate about their own axis. The road wheels, half shafts and sun wheels offer the same resistance to being turned and the differential gearing does not therefore operate. Both the road wheels turn at the same speed

1

2

2

Vehicle Cornering:-

When vehicle takes a turn, the inner wheel experiences a resistance and tends to rotate in opposite direction. Due to this the planet pinions starts rotating about their own axis and around the sun gear and transmit more rotary motion to the outer side sun gear. So that outer sun gear rotates faster than the inner sun gear. Therefore the outer road wheel runs faster than the inner road wheel and covers a more distance.

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c) Explain with neat sketch following type of rear axle:

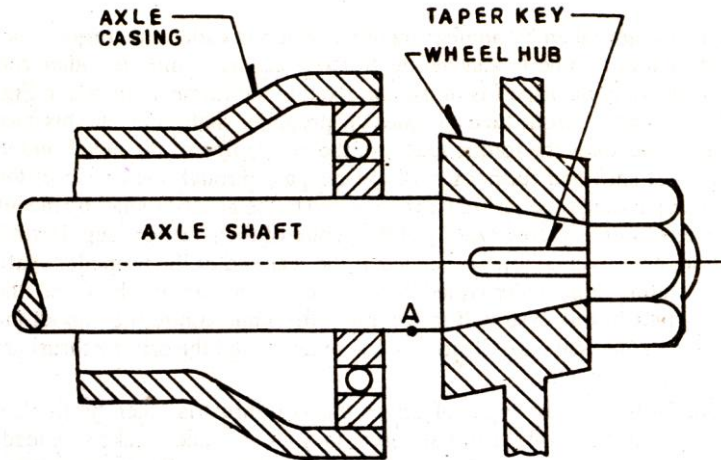
(i) Semi floating

(ii) full floating type

8

Answer:

(i) Semi floating rear axle:



Fig; Semi floating rear axle.

The figure shows a schematic diagram of the semi floating rear axle. A single ball bearing is inside the axle casing. The axle of the wheel is at the centre of the axle casing and the wheels are fitted at the end of the axle. This is done by means of key, bolt and nut. The whole weight of the vehicle is first transmitted to the suspension spring. From there it is transmitted to the axle casing from there to the axle and wheel. Finally it is transmitted to the ground. The axle can be removed by first placing a support below the axle casing.

(ii) Full Floating rear axle:

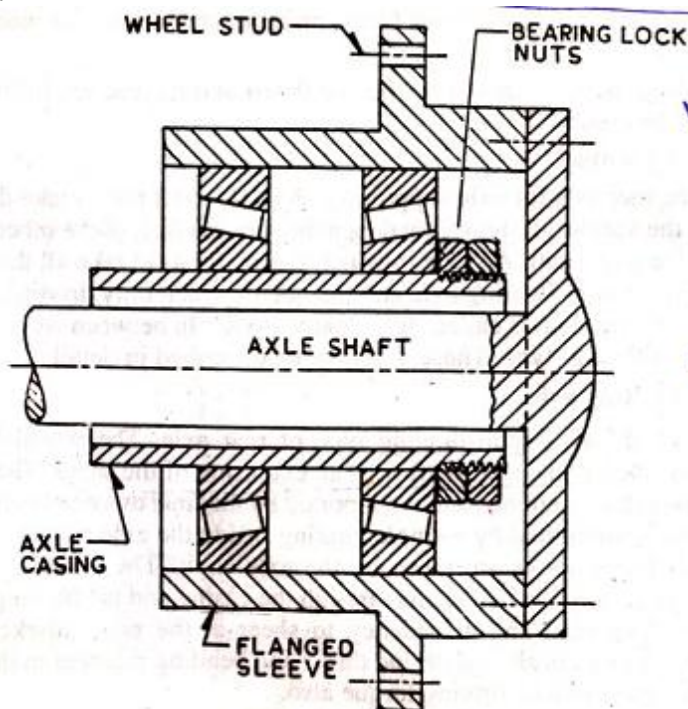


Fig: Fully-Floating rear axle.

2

2

2

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The figure shows the full floating axle. The wheel is on the axle casing. Two roller bearings are between the wheel and axle casing. The axle end is fitted with the wheel by means of a flange, bolt and nut. There are two roller bearings between the wheel and axle casing. This is the advantage of the fully floating axle, over other two types of axles. To remove the axle the bolt and nut are first loosened. The flange and axle can then be very easily removed. The vehicle continues to be supported by the wheel and the axle casing. Fully floating rear axle is used in heavy commercial vehicles.

2

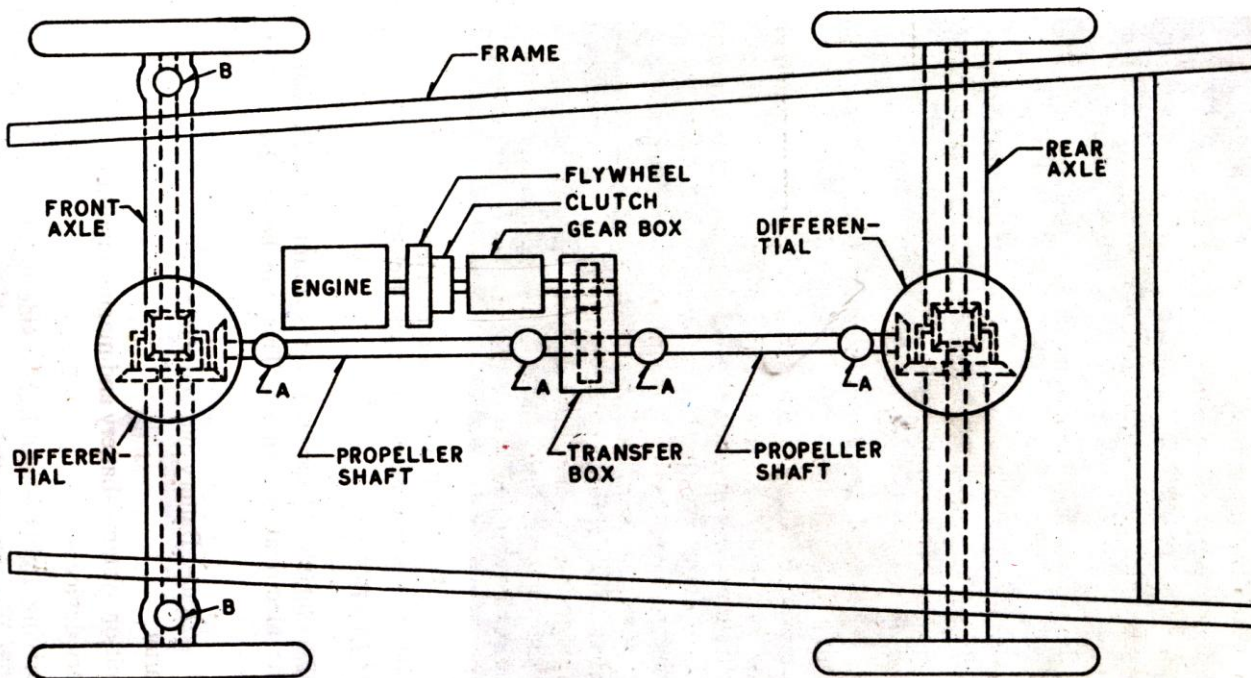
6. Attempt any TWO of the following :

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a) Draw a neat labeled diagram of four wheel drive vehicle layout. State two merits and two demerits of four wheel drive over two wheel drive vehicle layout.

8

Answer



4

Fig: Four Wheel Drive layout.

2

Merits of 4-Wheel drive over 2-Wheel Drive: (any two merits)

1. Better traction on smooth surface in all conditions (wet and wintry weather)
2. Increased drive off and climbing capacity irrespective of load.
3. Better acceleration in lower gear.
4. Reduced sensitivity to side wind.
5. Better stability.
6. More balanced axle load distribution.
7. Equal tire wear.

2

Demerits of 4-Wheel drive over 2-Wheel Drive: (any two demerits)

1. More weight of vehicle.
2. Lower maximum speed.
3. Increased fuel consumption by 5 to 10%.
4. As extra components are required manufacturing cost is more.



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- b) (i) Write four advantages of radial ply tyres over the bias ply tyres.
(ii) Distinguish between tube tyre and tubeless tyre on the basis of weight, fuel efficiency life and road holding.

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(i) Advantages of radial ply tyre over bias ply tyre are, (any Four advantages)

Radial Ply tyre	Bias Ply tyre
1. known as steel belted radial.	1. known as bias ply or Nylon.
2. The ply cords run in the radial direction i.e. in the direction of the tyre axis. The cord runs from one side of the tyre directly across to the other side.	2. It consist of two or four layers of plies runs in opposite direction and are crossing each other at an angle.
3. More comfortable ride	3. Ride comfort is less.
4. More road contact, especially while cornering & on wet roads	4. Less contact patch hence less grip on road.
5. More resistance to puncture	5. Less resistance to puncture.
6. Initial tread life is more hence more milage	6. Comparatively less initial tread life.
7. More fuel efficient	7. Less fuel efficient.
8. Costlier	8. Cheaper
9. Difficult to repair	9. Can easily repaired
10. Virtually impossible to retreade	10. Can easily retreaded
11. Radial ply are meant for good roads	11. Cross ply is cross country tyre for any kind of surface.
12. There are no breaker strips in this.	12. There are a no of breaker strip which run in radial direction.
13. It is flexible & inextensible.	13. It is less flexible than radial ply.
14. It has more road adhesion.	14. It has less road adhesion.
15. It gives more stability of vehicle.	15. It gives less stability of vehicle.

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(ii) Difference between tube tyre and tubeless tyre

Parameters	Tube tyre	Tubeless tyre
Weight	Weight is more as it has tube and flap inside the tyre.	Weight is less due to absence of the tube.
Fuel efficiency	Fuel efficiency is less as its unsprung weight is more.	Fuel efficiency is more as its unsprung weight is less.
Life	The heat dissipation does not take place due to which life of tyre is less.	The life of tyre is more due to better cooling.
Road Holding	Steering and road holding is fair.	Steering and road holding is good.

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- c) (i) What are the effects of high inflation pressure in tyres?
(ii) Explain specifications of tyres with the help of example.

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Answer:

(i) Effects of high inflation pressure in tyres-

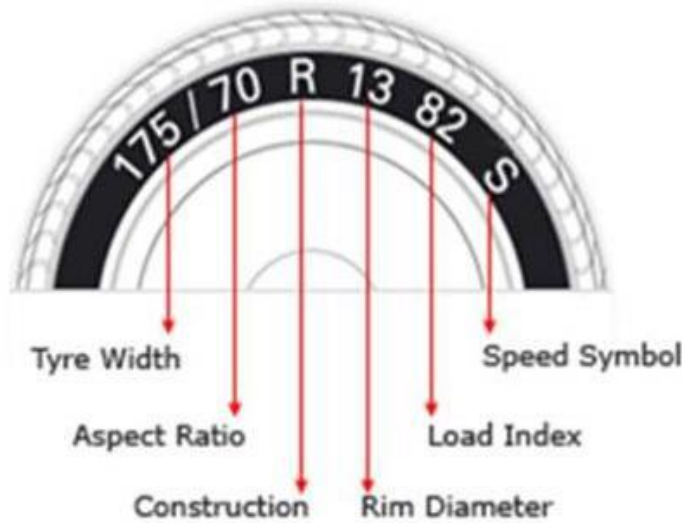
The tyre must be inflated according to the specification of the original vehicle manufacturer. This will provide better performance, better heat control, Increase tread life, better comfort & better vehicle control.

The effects of high inflation pressure are as below. (*any Four*)

1. Rapid wear of tyre tread in centre only.
2. Abnormal stresses & strains in the tread area, causing tread-separation, ply separation & tread cracking.
3. Harsh riding
4. Reduction in cushioning effect.
5. Decreased resistance to skidding due to lower contact area.
6. Reduced driving control at high speeds.
7. Lack of directional stability.

4

(ii) Specifications of tyres - The tyre is specified as given below-



4

OR

(*credit should be given to any suitable Example*)

E.g. - 175/70 R 13 82 S

Where, 175 = tyre Width in mm

70 = Aspect Ratio of tyre in Percentage

R = Radial

13 = Rim Diameter in inches

82 = Load Index

S = Speed rating