

USN



Internal Assessment Test 3 – May 2018

Sub:	Automobile Engineering				Sub Code:	15ME655	Branch:	ME				
Date:	22/05/18	Duration:	90 min's	Max Marks:	50	Sem / Sec:	VI/A&B			OBE		
<u>Answer any FIVE FULL Questions</u>										MARKS	CO	RBT
1	Explain the following terms with a neat sketch (a) Camber (b) Kingpin inclination (c) scrub radius (d) Included angle (e) castor						[10]		CO3	L2		
2	Explain power steering with neat sketch						[10]		CO3	L2		
3	Explain telescopic type of shock absorber with a neat sketch						[10]		CO3	L2		
4	Explain air suspension system with a neat sketch						[10]		CO3	L2		
5	Explain battery ignition system with a neat sketch						[10]		CO3	L2		
6.	Explain transistorized ignition system with a neat sketch						[10]		CO3	L2		
7.	What is meant by ignition advance? Explain Centrifugal and Vacuum advance mechanisms with a neat sketch.						[10]		CO3	L2		

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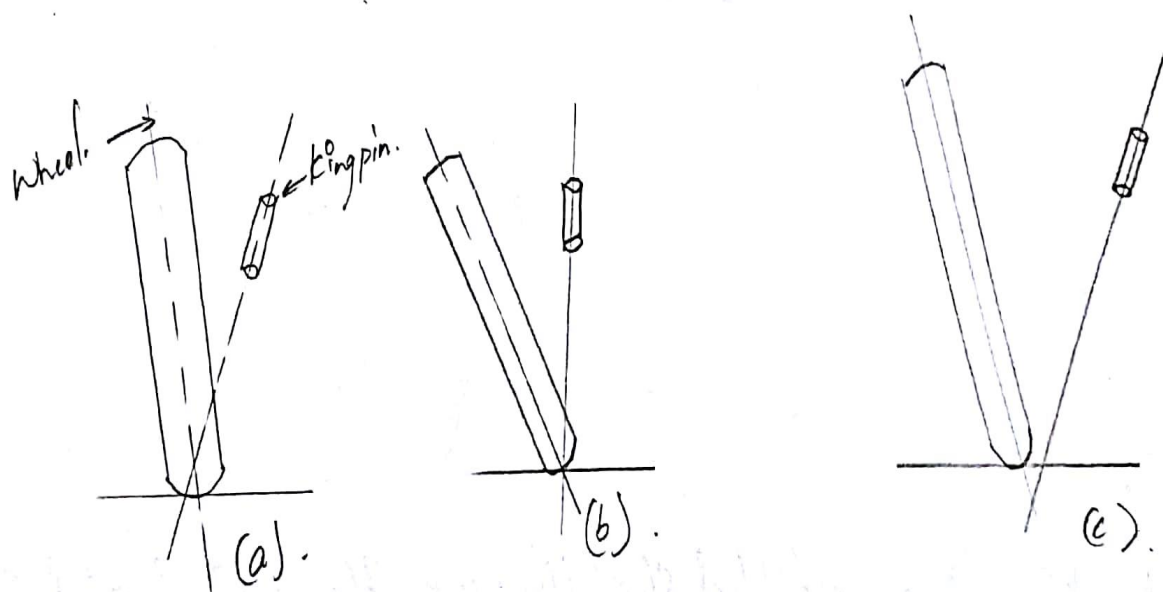
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# 1 King pin angle.

The king pin (or) Ball joints are mounted in such a way that they slant inward. The king pin inclination is the inward tilt of the king pin (or) ball joint centre line from the vertical. In case of king pin it is called king pin angle. In case of ball joint it is called as steering axis inclination.

Included angle & scrub radius.

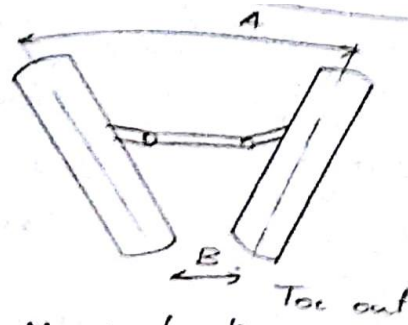
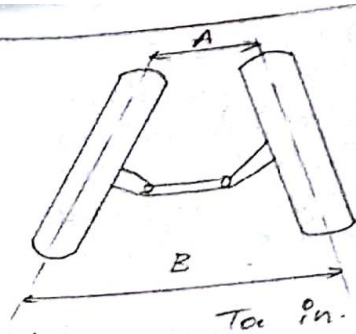


The wheel & king pin centre line meet (a) above the ground. wheel toe in (b) & exactly on the ground (c) Below the ground. wheel toe out.

It is the angle obtained in the vertical plane, b/w the wheel centre line & the king pin inclination ( $X+Y$ )

The distance b/w the king pin centre line & wheel centre line where it meets the road surface is called scrub radius.

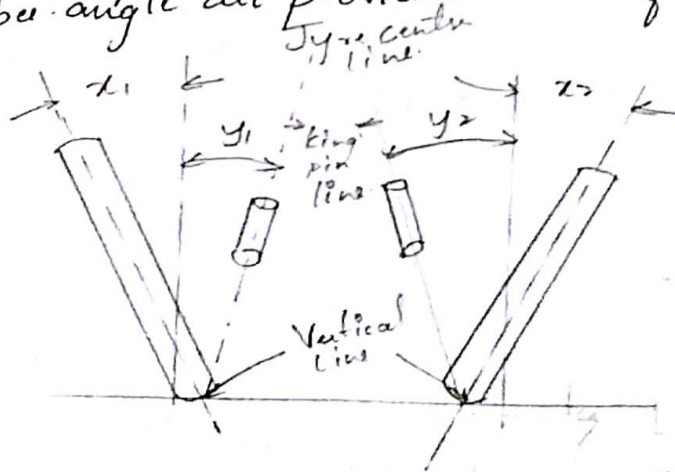
A negative scrub radius causes the wheel to toe in (a).  
A positive scrub radius causes the wheel to toe out (b).



Camber.

Camber angle is the inclination b/w the centre line of the tyre & the vertical. If the wheels are inclined or tilted outward at the top it is called positive camber & if the wheels are inclined inward at the top it is called negative camber. It is also called as wheel rate angle.

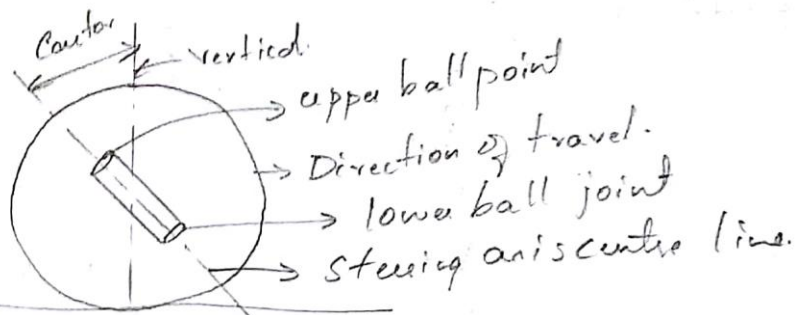
To make the tyre wear more uniform & increase the life of the tyre camber angle are provided to the front wheels.



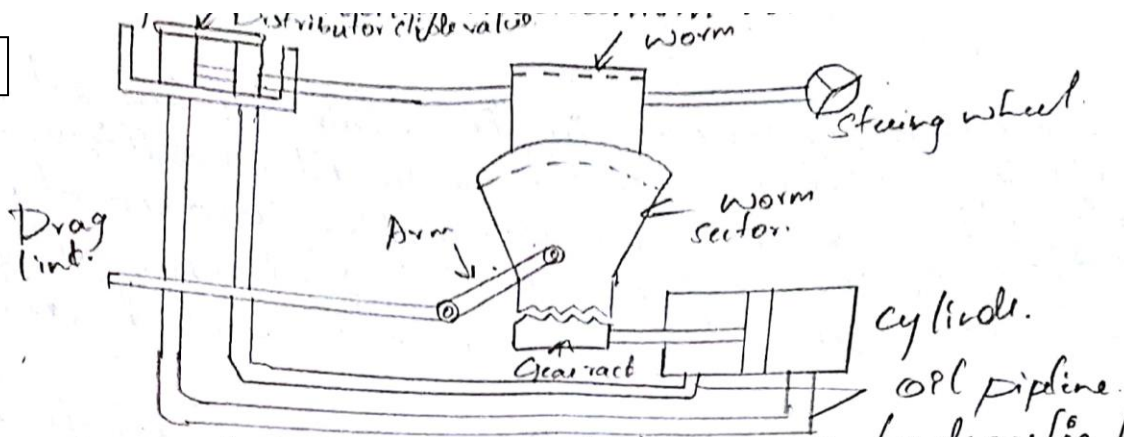
Castor

The king pins are tilted slightly from the vertical obtained in the plane b/w king pin-centre line & vertical is called the castor angle. If the king pin-centre line contacts the ground at a point in front of the wheel centre line it is called positive castor. If it meets behind the wheel centre line it is called negative castor. The castor angle should not exceed 3 degrees.

It gives directional stability by making the wheels to lead or angle follow in the same direction as the vehicle moves.

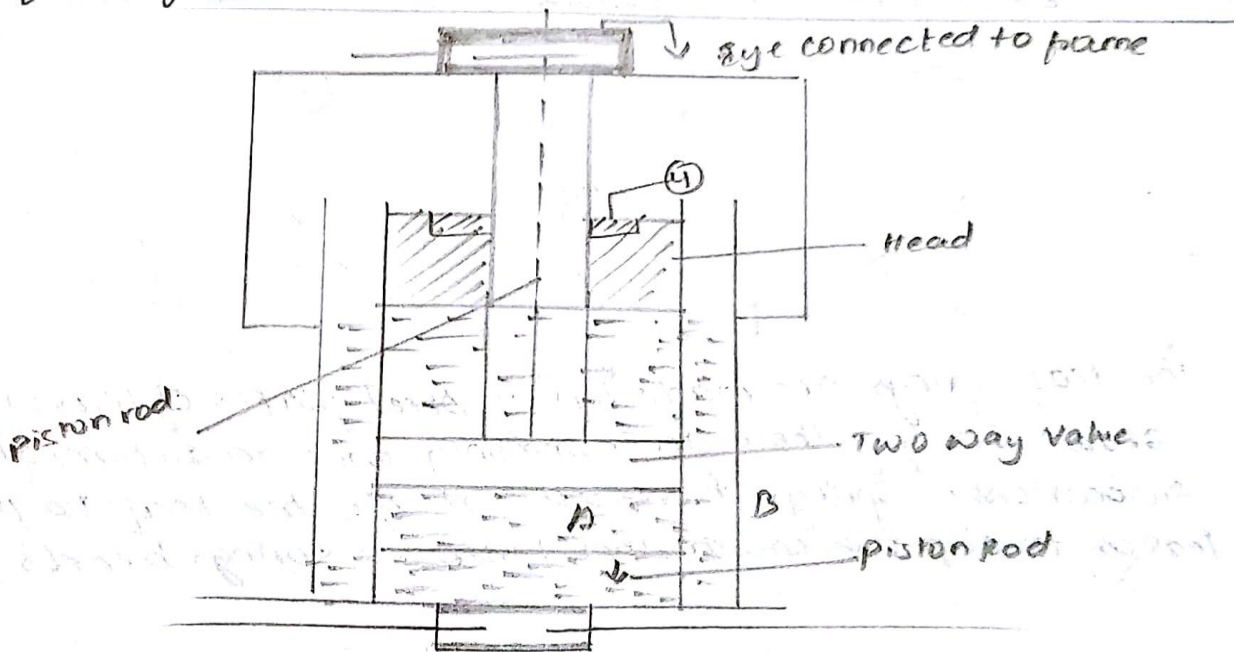


2



The figure shows a simplified diagram of hydraulic booster. The arrangement consists of a worm-wheel, distributor slide valve, booster cylinder etc. when the steering wheel is turned the worm turns the sector of worm wheel & hence actuates the arm. The arm returns actuates the road wheels through drag link. If the resistance offered to turn the wheels through too high & driver effort to the steering wheel is too weak then the worm like a screw in a nut will be displaced axially together with the distributor slide valve. This axial movement will admit compressed air or oil into booster cylinder through pipe line. This piston in the booster cylinder will turn the road wheels via the gear rack, the toothed sector arm & drag link.

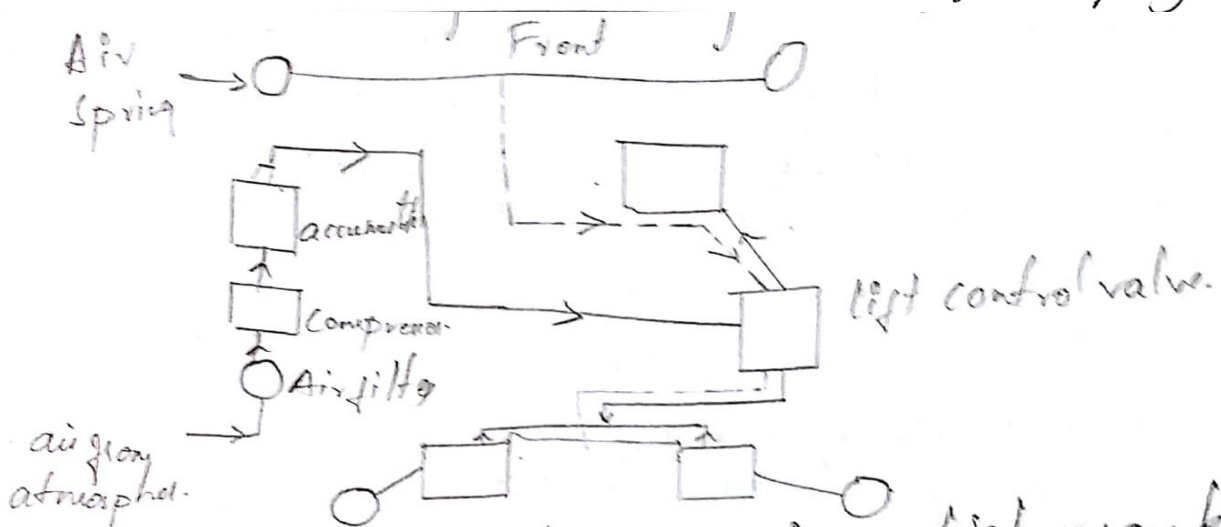
3



Shock absorbers are necessary as the springs do not settle down fast enough. In other words after a spring has been compressed and released, it continues to shorten and lengthen as oscillate for a time.

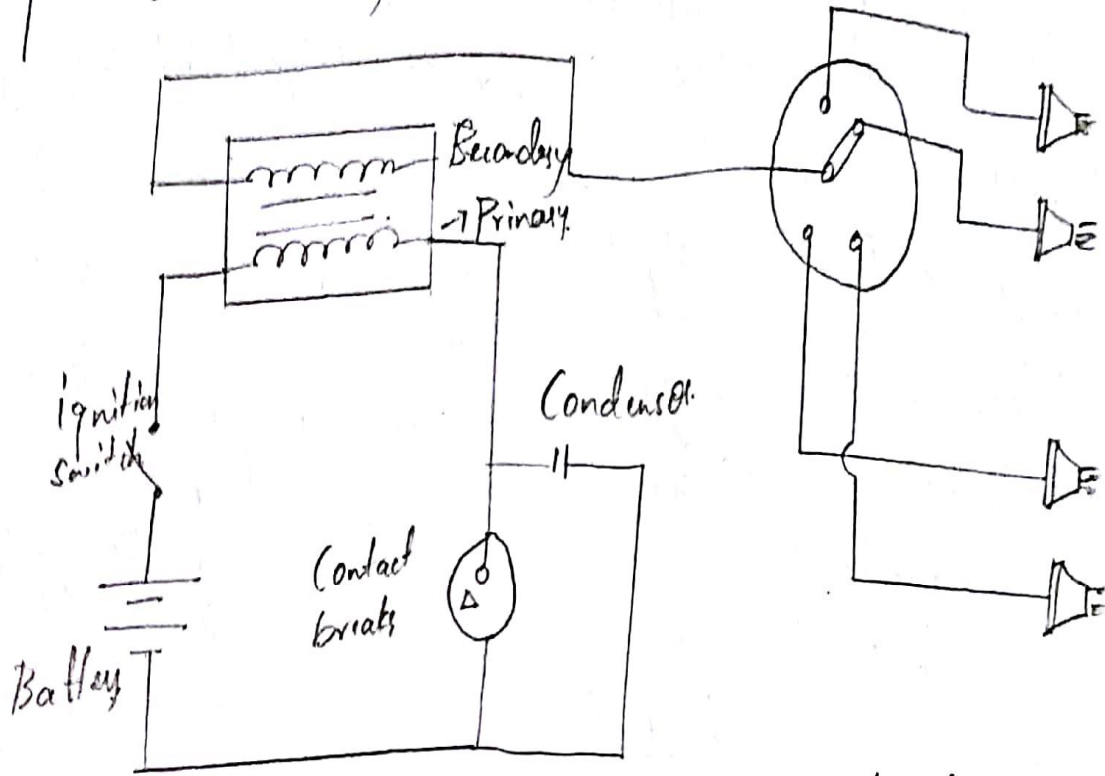
The inner & outer cylinders are filled with oil when the vehicle comes across a bump, the eye connected to axle will move up with this the oil below valve 1 will move up. Due to the resistance to the flow of oil through valve 1 the flow of oil through valves 1 & 2 will be slow because of damping effect

4



In air suspension system, four air springs which may be of bellows type (or) piston type are used instead of coil spring. The atmospheric air passes through to filter & compressor raises its pressure to about  $24 \text{ kg/cm}^2$  & air at this pressure is accumulated in an accumulator. The relief valve in the accumulator tank acts as a safety valve. This high pressure air then enters to the springs through lift control valve & levelling valves.

Majority of S.I engine utilize battery ignition system. The system produces high voltage spark & delivers to the spark plugs at correct time & regulates intervals with respect to crank position.



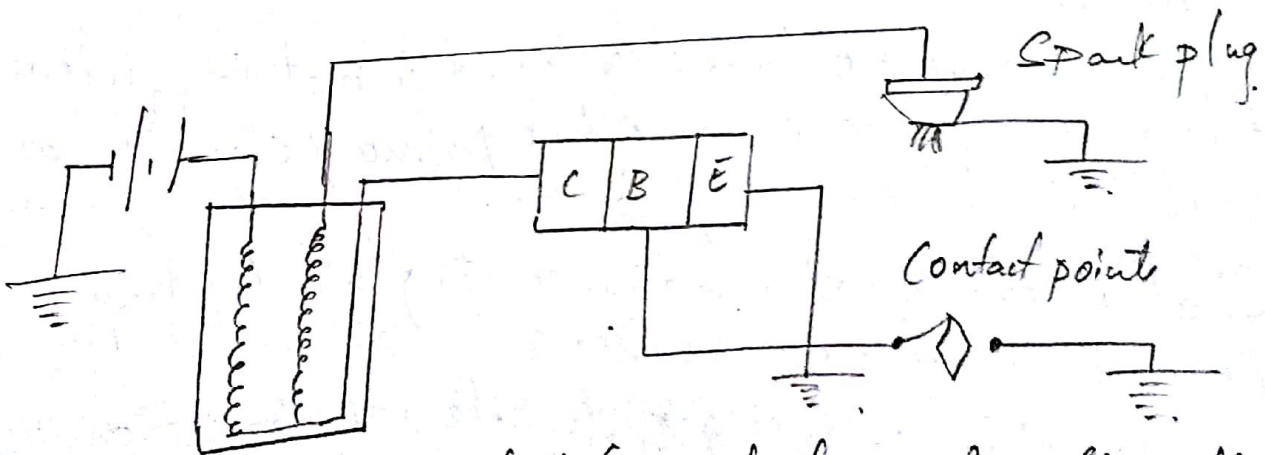
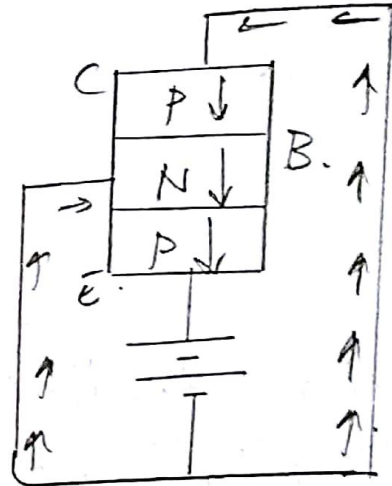
Working:- When the contact points are closed, the primary circuit is completed & primary current flows through primary winding - This induces an E.M.F in the secondary coil & is proportional to the rate at which magnetic flux increases.

The secondary voltage developed is not sufficient to produce a spark because the primary circuit has to establish the magnetic flux.

6 In case of electronic ignition system transistor is used. The common material used for making transistor & diode is germanium & little bit of antimony is added to convert it into N-type semiconductor. The most commonly used in automotive ignition system are PNP transistors.

### Transistorized Ignition system

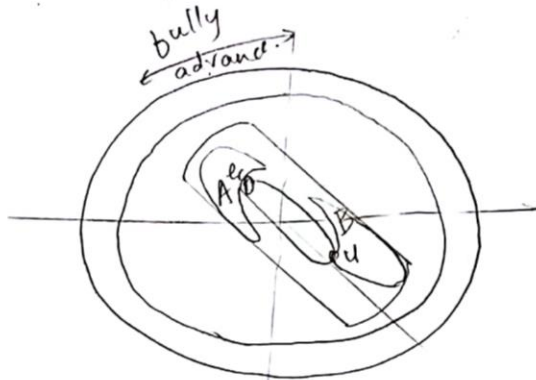
A single electric source supplies current to E-B circuit & E-C. Circuit as shown in fig. The base current is only a fraction of collector current, but the collector base current cannot exist without base current.



The base is connected to contact points & the collector is connected to the primary winding in the ignition coil. The emitter is grounded. When the cam operates, contact breaker points opens & base current is primary it interrupted.

7 Centrifugal advance.

In this method ignition timing is controlled depending on engine speed. The system consists of an advance cam integral with the ignition cam a pair of centrifugal weights A & B as shown in fig. The weights A & B are connected to the break plate 'c' by using springs. When the engine speed increases, the centrifugal weights swing out due to the centrifugal force.



Vacuum advance.

In this method, control of ignition advance can be done according to engine load. The system consists of a sub-diaphragm which is connected to the base plate of the distributor. Atmospheric pressure is acting on one side of diaphragm while on the other side vacuum from the carburetor acts. The springs keeps the system at zero advance if no vacuum is applied.

