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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.

*

	Vlarks
1. A) Attempt any THREE:	12
a) List Out different type of rear axles used in vehicle and draw a neat sketch of any one rear axle	4
Answer: Different type of rear axles used in vehicle: (List of types- 1 mark, labelled sketch of any on type -3mark) Rear axle used in a vehicle may be – Live axle or Dead axle. Types of live rear axle are - 1. Semi-floating type 2. Full floating axle 3. Three quarter floating axle	? 1
Semi-floating type Axle casing Axle casing Axle Shaft Axle Shaft Taper hub Hull floating axle Full floating floating Full floating Full floating Full floating Full floating Full floating Full floating Full floating Full floating Full	3
b) Write down advantages and disadvantages of pneumatic brakes.	4
 Answer: Advantages and disadvantages of pneumatic brakes: Advantages: (Any 2 - 2 marks) 1. Pneumatic brakes are much more powerful than mechanical or hydraulic brakes and an exclusively used in medium and heavy duty vehicles. 2. It simplifies the chassis design. 3. Apart from braking, the compressed air from reservoir can be used for tyre inflation, windscree wipers, horns & many other accessories. 4. A very small effort applied by the driver at brake pedal produces more force for braking. 5. This brake is more effective even in considerable leakage 	2



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A is the engine shaft having clutch gear B rotate at engine speed, gear B, C, D, E are on main shaft and gear U_1 , U_2 , U_3 and U_4 are the gear on lay shaft. U_5 is the intermediate gear. F_1 and F_2 are the synchromesh members free to slide on main shaft which is spline internally.

 G_1 and G_2 are the ring shape members having internal teeth which fit onto external teeth of member F_1 and F_2 , K_1 and K_2 , L_1 and L_2 are dog teeth on gear B, C, D, E, T_1 and T_2 are the ball supported by spring. S_1 and S_2 are the forks.

Working: To obtain low gear, member F_2 moves towards left which causes the friction contact between the cone shape surface of gear D and member F_2 . The friction or rubbing makes the speed equal then member G_2 override to left to engage with teeth K_2 and low gear is obtained. Similarly when member F_2 slides toward right, mesh with gear E, a reverse gear is obtained.

Similarly for second gear the member F_1 and G_1 are slide to the right so that finally the internal teeth on G_1 are engaged with L_1 then the drive to main shaft from gear B - U₁ - U₂ - gear C - G₁ - F₁ to spline. A direct gear is obtained by sliding member F_1 toward left.





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OFCAR

mmmmm

Fig : Caster

section makes them lighter and stronger than a solid shaft of the same size.

Working: The propeller shaft, differential and rear axle are suspended under the chassis with spring which causes up and down movement due to road irregularity. This up and down movement results in change in angle and length of propeller shaft. The universal joint takes care of the variation in the inclination of the propeller shaft during up and down movement of vehicle. They also permit the motion to be transmitted from the gear box shaft to the bevel pinion shaft of the differential at all times irrespective of the inclination of the propeller shaft. The slip joint serve to adjust the length of the propeller shaft when demanded by the rear axle movement.



iii) Toe-in: is the amount by which the front wheels are set closer together at the front than at the rear when the vehicle is stationary. Toe in = B - A

Fig: Camber

Ammmmm.



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(Note: Equivalent credit shall be given to any other suitable diagram)

When a vehicle come across the bump, the bottom eye is moved upwards, then the fluid below the piston must be displaced to the top side of the piston, the fluid will now pass through the outer ring of hole in the piston by lifting the top disc against the disc spring. But the volume above the piston is less due to piston rod. As such, fluid from the bottom of the piston will also get displaced through inner ring of holes in the foot valve and enter the reservoir space between the cylinder and outer tube so the fluid level in the reservoir space will rise. When the cylinder moves down ward, fluid will be displaced form the upper end of the cylinder to lower end through the inner ring of hole in the piston by opening the lower disc valve against coil spring because of the volume of the piston rod that leaves the cylinder, the fluid will be drawn into the lower end of the cylinder from the reservoir space through the outer ring of hole in the foot valve. This passing of fluid through opening provides damping.



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d)	d) Differentiate between sheet metal cutting and forming process in car body manufacturing		
Answe	Answer: Difference between sheet metal cutting and forming process:		
Sr.	Sheet metal cutting	Forming	
no			
1	It is cut by shearing machine or scissor.	The metal sheet is formed by using punch and die	4
	The desire used of model sheet is seed and	The model should be a more that into the install	
2	The desire part of metal sneet is used and	The metal sheet is converted into desired	
2	remaining part is discarded.	shape without wasting the material.	
3	In this material is wasted or removed from the	No wastage of material.	
4	work piece.	Description description optimized by disc	
4	e.g. piercing, punching, blanking ,slitting,	Drawing, deep-drawing, coining, bending,	
	lancing, notching are the example of cutting	embossing are the examples of forming	
	operation.	operation.	
e) W	Vrite down design procedure for a simple fixture u	used in milling.	4
Answe	er: Design procedure for a simple fixture used i	in milling:	
Fixt	ture is used for holding, locating and supporting	the workpiece during machining. The following	
steps s	should be followed while designing a fixture:		4
1.1	1. Draw the outline of the workpiece in position of machine.		
2.1	Inspect the drawing carefully and note all limit	ted dimensions and features which are strictly	
	related.		
3.0	Consider the sequence of operations.		
4.1	Draw the locating system for locating the workpie	ce in the fixture.	
5.1	Draw the clamping system for clamping the work	piece in the fixture.	
6.1	Draw the tool setting dies i.e. method of positioning	ng the tool relative to the component.	
7.1	Decide the most suitable body or surface for the fi	xture.	
8.0	Combine all the components rigidly.		
f) List	down design consideration for jig & steps to be for	ollowed.	4
Answe	er: Design consideration for jig & steps to be fo	llowed: (Any eight point - 4 mark)	
1 The	1 The main frame of its must be strong anough as that the deflection of its is as minimum as a set it.		
	bis deflection of jig is caused due to the forces of	autting alamping of the work piece or elemping	
to	I his deflection of jig is caused due to the forces of cutting, clamping of the work piece or clamping		
lU oh	to the machine table. The maintrame of the jig should have the mass to prevent vibration and		
2 Erc	Chanter.		
2. FIZ	2. Frames should be built from simple sections so that frames can be fastened with screws or welded,		
W	nenever necessary. Those parts of the frame that	the service. Where the hadre of its or firsters had	
pa	ans needing frequent changing may be need with	the screws. where the body of jig of fixture has	
	complex shape, it may be cast from good grade of cast iron.		
3. Cla	imping should be fast enough and require least am	ount of effort.	
4. Cla	imps should be arranged so that they are readily av	allable and may be easily removed.	
5. Cla	imps should be supported with springs so that c	clamps are held against the bolt head wherever	
pc			
6. If 1	6. If the clamp is to swing off the work, it should be permitted to swing as far as it is necessary for		
re	removal of the work piece.		
/. All	locators, clamps should be easily visible to the	ne operator and easily accessible for cleaning,	
po	ositioning or tightening.		



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8. Provision should be made for easy disposal of chip so that storage of chips doesn't interfere with the operation and that their removal during the operation doesn't interfere with the cutting process. 9. All clamps and support points that need to be adjusted with a wrench should be of same size. All clamps and adjustable support points should be capable of being operated from the fronts of the jig. 10. Workpiece should be stable when it is placed in jig. If the workpiece is rough, three fixed support points should be used. If workpiece is smooth, more than three fixed support points may be used. Support point should be placed as farthest as possible from each other. 11. The three support points should circumscribe the centre of gravity of the workpiece. 3. Attempt any FOUR : 16 a) Draw a diagram of epicyclic gear box and its advantages 4 Answer: Epicyclic gear box: Advantages: (Any two) 1. All gears are constantly in mesh, so change of one gear to another is possible without any loss. 1 2. It is quieter in operation 3. Uniform distribution of load over all gears having greater tooth contact. Ring gear Planet 2 Sun gear Sun gear Planet shaft carrier shaft Planet carrier Planet Figure: Simple epicyclic gear box b)Explain construction and working of power steering used in vehicle. 4 Answer: Construction and working of power steering: The power steering is of two types: (a) Integral type (b) Linkage type Power steering system consists of worm and ball bearing nut steering gear with a hydraulic rack piston concentric with the worm shaft which can aid in moving a nut in either direction by means of a 1 hydraulic pressure. A reaction contact valve is linked to the worm shaft thrust bearing through a link and actuator lever. This system uses compressed air, electrical mechanisms and hydraulic pressure. A simplified sketch of Hydraulic power steering with hydraulic booster is shown as below-



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4

4

In this system, there is a telescopic strut type shock absorber, a single arm and a diagonal stay. A strut is fixed to the body structure at the upper end through a flexible mounting and a lower part of the strut is connected at the bottom by a joint to the lower arm. The lower part of the strut also carries the stub axle, which in turn carries the wheel. The steering motion is supplied to the lower part of the strut and it turns the whole strut. A coil spring and a hydraulic damper surround the upper part of the strut which takes care of the road roughness shocks and vibration.

d) Explain any two manufacturing processes used for production of connecting rod.

Answer: Manufacturing processes used for production of connecting rod:

Connecting rod is manufactured by means of forging process. Another process used for manufacturing connecting rod is casting process.

1. Forging Process: In forging process the round bar of desired dimensions has been taken and is heated in oven up to red hot. Then it is kept on the anvil and hammered to the desired shape. The desired shape is given by means of fullering or upset forging.

The heated stock is elongated by reducing its cross section in first die. The operation is known as "Fullering".



The metal is redistributed, increasing the cross section at certain places and reducing at others as required filling the cavities of the die. The operation is known as "Edging". General shape is given in first blocking die. Finished shape is given to forging in final impression die. Flash is removed.



2. Casting Process: In casting process the molten metal is directly poured into the mould of desired dimensions and cooled to solidify and taken out of mould box. Then it is cleaned by sand blasting and machining is done if required.

e) State the application of different types of jigs.

Answer: Application of different type of jigs: (Any four – 1 mark each)

Types: (1) Template jig, (2) Plate jig, (3) Channel jig, (4) Diameter jig, (5) Leaf jig, (6) Ring jig, (7) Box jig. 8) Wood working jigs

Application of jig:

- 1. Wood working jigs are used for creating intricate wooden profiles.
- 2. Template/ Plate jig is used to drill holes on large parts (high thickness plates/sheets or rods).
- 3. Diameter jig is used to drill radial holes on a cylindrical or spherical workpieces.
- 4. Ring jig is used to drill holes on circular flanged parts.



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4. A) Attempt any THREE :



Figure: Disc brake

In fixed caliper type, the two shoes are located on each side of the disc when the driver depresses the brake pedal. The fluid under pressure is sent from the master cylinder through the connecting tube 2



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into the caliper unit behind the piston as shown in Fig. The shoes are now forced against the disc by the hydraulic pressure. The shoe exerts a pressure on the disc as like squeeze piece of paper between your thumb and first finger as you picked it up. The friction between the pads and the revolving disc then	
provide the braking action thus wheel speed is reduced.	
c)Enlist any four objectives of vehicle suspension system.	4
Answer:	
Objectives: (Any four)	
1. To act as a safeguard for the occupants against road shocks and provide comfort ride.	4
2. To preserve the stability of the vehicle in rolling, pitching, while in motion.	
3. To minimise the effects of stresses due to road shock on mechanism of a vehicle and provide cushioning effect.	
4. To provide the required height to body structure as well as bear the torque and braking reaction.	
5. To keep the body perfectly in level while travelling over the uneven road.	
d)Explain forging and heat treatment process for production of crank shaft	4
Answer: Forging and heat treatment process for production of crank shaft:	
Forging : Stock/ round bar is heated to the desired (red hot) temperature. After heating it is hammered or rolled (roll forging) at predetermined portions to change or redistribute the shape. Then it is forged in the impression or blocking die to the final shape. The final shape is trimmed in blanking die to remove the flash or excess metal.	2
Due to the hammering in forging process stresses are induced in the crankshaft and hence to remove the internal stresses and indentations forging is followed by stress relieving heat treatment (annealing).	
Heat treatment: In heat treatment process the crankshaft is heated in the furnace to suitable temperature. After heating it is soaked at that temperature for some time for uniform heating and cooled to room temperature in the furnace. Thus stresses and indentations are removed for increasing the life of the component. The upper portions of connecting rods are only in operation and hence require high hardness and hence those portions are only hardened by means of hardening or induction hardening.	2
B) Attempt any ONE of the following:	6
a) List the various location devices. Explain any one with the help of suitable sketch.	6
Answer: Location devices: (List of locating devices – 2 marks; Explanation of any one - 2marks and	
related sketch - 2 marks)	
The locating devices are:	
1. Pins (Locating, supporting and Jack pins)	2
2. Radial or angular location (diamond pin, V-location, bush location)	
1. Diamond Locator: (Sketch -2 marks explanation -2 marks)	
Diamond shaped pin should be used to constrain pivoting of the work piece around principle locator. The principle locator should be longer than diamond pin so that workpiece cannot be located and	2

pivoted around it before engaging with diamond pin. This will help in removing of the workpiece quickly. Figure 3.12 shows locating the workpiece with diamond shaped pin. If two fixed pins are



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provided, it will not accommodate the variation in the central distance of hole. This problem is avoided by using diamond pin. Also one diamond pin is sufficient to position the hole in the workpiece while other hole is positioned with the help of fixed pin.

The diamond locator should be positioned in smaller hole. As the width of diamond pin is less than the diameter of diamond pin, the variation in the hole is accommodated by diamond pin.



2. V location : In V-location workpieces having circular or semi-circular profile are located by means of a Vee block. The v-block should be used correctly so that the variations in the work piece size are not detrimental to location.



Figure: V – Location

3. Bush location: These type work pieces can be easily located in hardened steel bushes small and medium sized bushes are usually press fitted into the jig or fixture body whilst the large bushes are push fitted in the body and located by means of screws. The bushes can be plain or flanged type. A flange strengthens the bush and also prevents it form being driven into the jig body if it is left unlocked. In all the bushes the entrance of the bush is chamfered coned or bell mouthed to facilitate loading of the workpiece.



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Figure: Flattened pin locator



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b) Explain the terms with respect to leaf spring i) Hardening	6
ii) Tempering	
Answer: Leaf Spring:	
i) Hardening: In this the leaf or blade is heated to a temperature above critical point and held at that temperature for a definite period of time and then quenched in water or oil or molten salt bath. In this the leaf spring is harden to 20 to 30 ^o C above upper critical temperature for hypo-eutectoid steel and 20 to 30 ^o C above lower critical temperature for hypereutectoid steel. The processed spring leaves are heated to a temperature of 825°cto 875°C (upper critical temperature) in a conveyorised or walking beam furnace for about 30 to 35 minutes depending on the cross section and chemical analysis of the leaf. When it is discharged from the furnace, the leaves are cambered to a desired bend in a cambering machine and immediately dropped into a quenching tank filled with quench oil. The leaves travel though the quenching medium for around 15 minutes.	2
ii) Pre Stressing : Pre-stressing is a process used by the spring industries that have significant benefits to spring performance. This process improves the available elastic deflection of the springs. The stress in the full length leaves are 50 % greater that the stresses in graduated length leaf. One of the methods of equalizing the stress in leaf spring is to pre- stress the spring. The pre stressing is achieved by bending the leaves to different radii of curvature before they are assembled to centre. The full length leaves is given a greater radius of curvature than a graduated leaf. The initial gap C between the full length and graduated length leaf before the assembling is called nip. Such pre stressing achieved by a difference in radii of curvature is known as nipping.	2
iii) Tempering: These leaves are stacked in a trolley attached to a electrically heated tempering furnace. The trolley stacked with quenched leaves (hardened) are moved into the tempering furnace chamber where they are heated to a temperature of 450 °C to 500 °C and remain in the chamber for 60 minutes after which the trolley is pulled out and cooled. The heat treated leaves are verified for correct hardness. The tempering stabilizes the structure of metal of leaf spring giving right toughness and shock resistance and relieves internal stresses.	2
5. Attempt any FOUR of the following:	16
a) State the necessity of clutch and draw the sketch of coil spring type single plate clutch.	4
Answer: Necessity of a Clutch : Clutch is used to transmit the rotary motion of one shaft when desired to second shaft, of which axis are coincident with that of first. In a vehicle, the clutch is always in the engaged position. The clutch is disengaged during the gear shifting, while stopping the vehicle or during braking and when idling the engine. It should be disengaged by operating the clutch pedal. When clutch operated properly it prevents sudden jerk motion of the vehicle and this avoids putting under strain on the remaining part of the power transmission.	1



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3



This system consist of master cylinder, wheel cylinder, steel pipe, flexible hose, brake linkage and a check valve at the end of master cylinder.

When the operator presses the brake pedal, this force is transmitted to the piston in master cylinder through linkage. The piston in master cylinder moves to left (from Figure) by compressing the return spring. As bypass port is covered, further movement of piston builds up pressure in the compression chamber. When sufficient pressure is built up, the fluid checks the valve deflect and the fluid under



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pressure in the pipe line enters in wheel cylinder. As soon as the fluid enters in wheel cylinder, it exerts a pressure on two pistons to move the piston outward. This outward motion of pistons causes the brake shoes expand creating tension in retracting spring. The brake shoe lining is pressed tightly against the internal surface of brake drum. This friction between the brake lining and drum, slows down or stops the rotation of the drum and hence the vehicle slows down or stops.

As brake pedal is released, the retracting spring pulls the brake shoe inward to original position. This causes the piston in wheel cylinder to push back. Due to this the brake fluid flows in reverse direction i.e. to the master cylinder and to fluid reservoir. s the pressure drops in the fluid line, the fluid check valve at the end of master cylinder closes.



The front dead axles called as rigid axles are straight axle, double drop axle and fully drop axle type. These are made by drop forging from steel having 0.4% carbon or 1.3% nickel steel. The front axle is made of I section at the centre portion. While the ends are made either circular or elliptical. The 'I' section construction takes bending loads due to the load of the vehicle and also the torque due to braking of the wheels. To keep the chassis height low, the centre portion of the front axle is given a downward sweep. It reduces the swing or sway of the vehicle while cornering and give greater stability as well as safety at high speed. The centre of gravity of the road vehicle was lowered by dropping the entire center portion.

The dead front axle transmits the weight of front part of the vehicle to the road surface through the front wheels. It also carries the steering mechanism and absorbs shock due to road variation. The rigid type front axle was used in connection with leaf springs. The two longitudinal leaf springs fixed to the two spring seat on the axle beam.



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d) Write down casting and machining process used in cylinder block manufacturing.	4
Answer: Cylinder block manufacturing:	
Cylinder block is main structure of engine. The inner cavity of the block provides the necessary means to support the combustions. It provides many precision machined passages for cooling, bores and	
surfaces that ultimately support engine combustion. At the bottom the crankshaft is located and at the	
top cylinder head is bolted.	
The casting process used for manufacturing cylinder block is die casting. The molten material is	2
poured in die or mould having pattern of cylinder block. The molten metal solidifies and solid cylinder	
block is taken out and cleaned.	
The cylinder block is machined to remove the flash. The mating parts of the block are also	2
machined on milling or boring machines. The bores are machined on boring machine with high	
accuracy and good surface finish is achieved by honing process.	
e) List the essentials of milling fixture and advantage.	4
Answer:	
Essentials of milling fixture are:	
A neavy base location and clamping element and setting blocks.	
I. Dase: A neavy base is the most important element of an infining fixture. It is a plate with a flat and smooth under face. The complete face builds up from this plate.	2
ii I ocation and clamping elements: The same design principles of location and clamping apply	2
for milling fixtures as have been discussed earlier	
iii. Setting blocks: After the fixture has been securely clamped to the machine table the	
workpiece which correctly located in the fixture has to be set in correct relationship to the	
cutters. The setting block is fixed to the fixture.	
Advantages: $(Any two)$	
1. It holds the workpiece in correct position as a table movement carries it past the cutter or	-
cutters.	2
2. It is absorbing and damping out the vibrations resulting from the cutting action of milling	
cutters.	
3. It helps to easy loading and unloading as well as clamping the workpiece.	
4. It provides interchangeability with high accuracy.	
	4
1) Describe heat treatment, lapping process used in crank shaft manufacturing.	4
Answer: Crank shart manufacturing: 1 Heat Treatment:	
In heat treatment process the crankshaft is heated in the furnace to suitable temperature. After	
heating it is soaked at that temperature for some time for uniform heating and cooled to room	
temperature in the furnace. Thus stresses and indentations are removed for increasing the life of the	2
component. The upper portions of connecting rods are only in operation and hence require high	
hardness and hence those portions are only hardened by means of hardening or induction hardening.	



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2. Lapping:

Lapping is abrading process that is used to produce geometrically true surfaces, correct minor imperfections, and improve dimensional accuracy and to provide very close fit. Most lapping is done by means of lapping shoes or quills called laps that are rubbed against the work. Cylindrical works such as crankshaft lapped by rotating the work in lathe or drill or centreless lapping machine and reciprocating lap over the work in ever changing path.

6. Attempt any FOUR of the following:

a) List the more common types of clamps used in fixture. Explain any one with a neat sketch.

Answer: **Common types of clamps used in fixture:** (*Types – 2 marks, explanation of any one -2marks*) More common types of clamps used in fixture are:

- 1. Screw clamp, 2. Strap or Plate clamp, 3. Quick acting clamp (C-clamp), 4. Hook bolt clamp.
- 1. **Hook bolt clamp**: This is very simple clamping device and is only suitable for light work and where 1 the usual type of clamp is inconvenient.



1

16

4

2

Fig : Hook bolt clamp

2. **C Washer:** The C washer is a strap clamp with and open slot and is simple and quick in operation. The slot permits removal of C washer after slight loosening of the hexagonal nut. The distance across corners of the hexagonal nut should be less than the bore of the workpiece to passage of the nut through the bore during loading and unloading.



Figure: C- Washer

3.**Strap or Plate clamps:** These are made of rectangular plates and act like levers. In its simplest form the clamp is tightened by rotating a hexagonal nut on a clamping screw one end of the clamp presses against the workpiece and the other on the heel pin thus loading the clamp like a simply supported beam.



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1. Wishbone Type Suspension System: (Description - 1 mark, figure - 1 mark)

Answer: Construction and working of :

b) Describe construction and working of wishbone and trailing link suspension.

It consists of two wishbone arm pivoted to the frame. The upper wishbone arm is shorter in length than lower arm. This help to keep the wheel track constant, so avoid the tyre scrub and thus reduces the tyre wear. A small change in the camber does occur with such arrangement. The coil spring is located in between the lower wishbone and underside of the cross member. The weight of vehicle is transmitted from the body and the cross member to the coil spring through which it goes to the lower wishbone member. A shock absorber is placed inside the coil spring and is attached to the cross member and to lower wishbone member.

Figure: Screw Clamp.

When the vehicle come across a bump and wheel tends to move up, the lower and upper arm (control arm) moves up and the coil spring is compressed so shock absorber (damper) damps the vibrations set up in the coil spring due to road irregularities.

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1

1

1

Figure: Trailing link suspension+

 c) Explain working principle of rack and pinion steering gear.
 4

 Answer: Working principle of rack and pinion steering gear:
 4

 In this type of steering gear, a pinion is mounted at the end of the steering shaft. The pinion engages with the rack which is provided with ball joint at its each end in order to allow for the rise and fall of wheel. The rotary motion of the steering wheel is transmitted to the pinion. The circular motion of pinion is converted into the linear rack movement, which is further transmitted to tie rods to the stub axle through ball joint.
 2

 This type of steering gear provides sufficiently low gear reduction for car and it is quite suitable even for heavier motor vehicles if assisted with power.
 1



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adjustable spherical ended pads 'A'. These pads are adjusted to suit the variation in the size of work piece and lock in the position by check nuts. Two self adjusting supports 'A' are pushed upward by light spring. These springs are used to make sure that the support 'A' is positively in contact with the work piece. Clamping screw is used to lock support 'B'. On tightening the edge clamp, the work piece is pushed against the fixed jaw. This jaw is keyed in the fixture body to provide solid support to work piece against the heavy thrust developed in the operation.



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Summer – 16 EXAMINATION <u>Model Answer</u>

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