SCHEME OF VALUATION

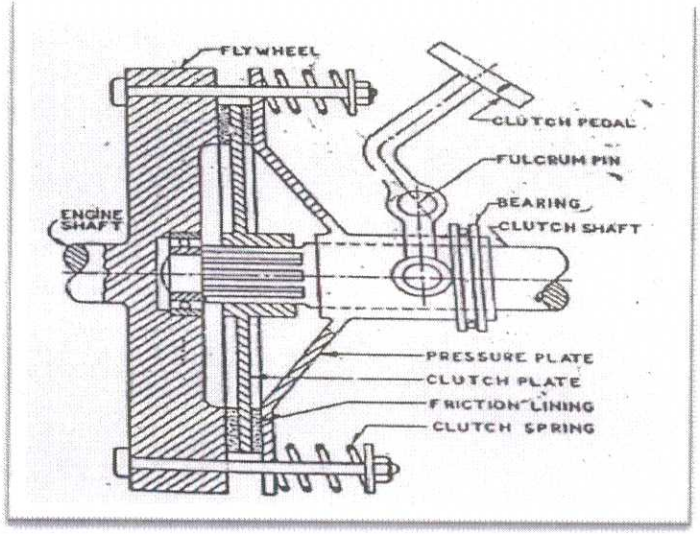
(Scoring Indicators)

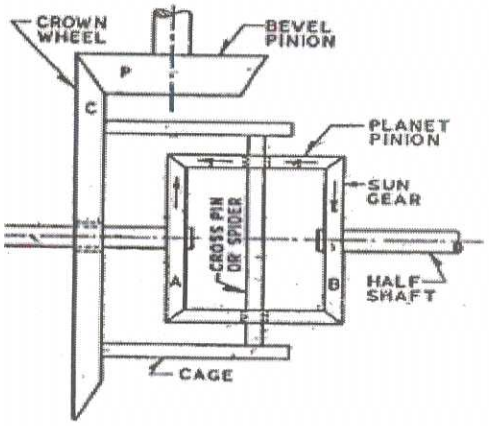
Subject Code: (15) 4022

Course Title: Automobile Engineering

Q.No.	Scoring Indicator	Split up Score	Sub Total	Total
I. 1	Gravity feed Vacuum feed Pressure feed (**Any four**) Pump system Fuel injection	½ ½ ½ ½	2	10
2	i) Torque converter transfers rotating power from an internal combustion engine, to a rotating driven load. ii) Another function is its ability to multiply torque when the output rotational speed is low.	1 1	2	
3	Steering wheel Steering column Steering box (**Any four parts**) Link rod Steering arm Tie rod etc	½ ½ ½ ½	2	
4	The procedure of driving air out of the braking (hydraulic) system is called bleeding of brakes.	2	2	
5	CO - 1.00 - 2.27 HC - 0.10 - 0.16 all values in gm/km (**Any two value**) NO_x - 0.08 - 0.11	1 1	2	
II. 1	**Air Cooling** (**Any four points**) 1) Due to direct transfer of heat from engine to air, no water jacket, radiator and water pump are required. Therefore weight is reduced. 2) Engine is smaller in size and its design much simpler. 3) Warm-up performance of air-cooled engine is better. This results in low wear to cylinders. 1 4) Volumetric efficiency of air-cooled engine is lower due to	1.5 1.5 1.5 1.5	1½×4 6	42

	higher cylinder head temperatures. 5) Air cooling cannot be employed for high specific output engines due to complex nature of fins required. 6) Air cooled engine is less sensitive to climatic conditions. Anti-freeze solution is not needed. 7) Control of cooling system is much easier. **<u>Water Cooling</u>** 1) Need for pump and radiator increases weight and air resistance of vehicle. 2) Engine has larger dimensions and its design is more complex. 3) Warm-up performance is poor and results in greater cylinder wear. 4) Volumetric efficiency of water-cooled engines is higher. 5) Since heat transfer coefficient of water is about 350 times that of air, water cooling can be used for high specific output engines. 6) Engine performance is more sensitive to climatic conditions. Cold weather starting requires use of anti-freeze solutions cooling can be used for high specific output engines. 7) Control of cooling system is comparatively difficult.			
2	**(Any four properties)** **(1) Viscosity.** Viscosity is a measures of the flow ability of an oil under a particular temperature and pressure **(2) Flash Point or Fire Point.** The lowest temperatures at which the oil flashes and fires, known as flash and fire points. These two temperatures must be sufficiently high for any lubricating oil to avoid flash or burn during use. **(3) Cloud.** The low temperature at which the lubricant changes from liquid state to a plastic or solid state is called cloud point. In some cases the oil appears to be cloudy at the start of solidification. **(4) Carbon Residue.** Lubricating oils being the chemical compounds of carbon and hydrogen, when burnt deposit carbon on the engine parts. This should be as low as possible for lubricating oil. **(5) Pour Point.** The lowest temperature at which the oil pours is called its pour point. Below this temperature the oil becomes plastic, so it does not produce hydrodynamic lubrication and therefore cannot be used below this temperature. **(6) Colour.** This test is not so important except for checking the uniformity of any given grade of oil.. **(7) Emulsification.** A lubricant when mixed with water tends to separate. The emulsification number is an index of the tendency of any oil to emulsify with water.	1.5 1.5 1.5 1.5	1½x4 6	

	(8) Oxidation at High Temperature. Lubricating oils may break down at high temperature due to oxidation producing hard carbon and varnish, which deposits on the engine parts. Therefore, lubricants must resist oxidation.. **(9) Specific Gravity.** Specific gravity of lubricating oil varies considerably and hence should not be regarded as the main indication of its lubricating property. **(10) Neutralisation Number.** Oil may contain impurities, if not removed during refining, which have deleterious effect on the properties of the oil.			
3	. **Figure : 3 marks** **Explanation: 3 marks**  The single plate clutch basically consists of flywheel, pressure plate, clutch plate, friction plate, thrust and ball bearing clutch spring and nut and bolt arrangement. Flywheel is connected to the engine shaft and thus when engine shaft rotates flywheel also rotates. The bolts are provided so as to connect flywheel and pressure plate. When we press the clutch pedal for disengagement of gear. Then, the spring gets compressed due to which pressure plate moves towards the right. When the pressure plate is moved then the friction plate gets released .Due to these, the clutch gets disengaged and we are able to shift the gear. When we release the clutch pedal then the pressure plate comes to original position and clutch is again engaged.	Fig 3 Exp 3	6	

4	 **Figure : 3 marks** **Explanation: 3 marks** • The Planet pinions are stationary when the vehicle is going a straight road, and the speeds of both the sun gears are equal, thus torque transmitted is the same. • Suppose if the vehicle is making a turn to the right, the main crown wheel may make N full rotations. • During that time, the left wheel will make more rotations because it has further to travel, and the right wheel will make fewer rotations as it has less distance to travel. • Now because of the resistance, the right sun gear will rotate at a lesser speed, say 'n' rotations less. The left wheel will rotate at 'n' more than the input speed due to the action of the pinion gears. • This will give the resultant speed on left wheel as (N+n) rpm and on the right wheel as (N+n) rpm	fig 3 Exp-3	6	
5	**(Any four differences)** Disc Brakes 1. Friction pads are directly exposed to cooling air 2. Friction pads are flat 3. Design is such that no loss efficiency due to expansion. 4. Weigh less 5. Better anti fade characteristics 6. Simple in design 7. Easy to replace rhe friction pads when required Drum brakes 1. Friction occurs on the internal surface 2. Friction lining in case of drum brakes are curved 3. Internal expansion causing loss of effective pedal travel. 4. Weigh more, about 20%. 5. More complex design	1½ x 4 1.5 1.5 1.5 1.5	6	

	6. Brake lining are fixed with adhesives to the brake shoes 7. Less costly			
6	**Advantages of MPFI system : (Any four advantages)** 1.MPFI improved fuel consumption. 2.Mileage will be improved in the MPFI technology used vehicle. 3.ECM technique is used to control the engine. 4.Precise supply of air-fuel mixture. 5.Engine response is good in the throttle applied condition also. 6.The MPFI engines vibrate less and don't require to be cranked twice or thrice in cold weather. 7.MPFI helps in uniform combustion of fuel inside the combustion chamber. 8.Each cylinder is supplied with the precise and uniform quantity of the air-fuel mixture. 9.Cleaner emissions. 10.MPFI improves functionality and durability of the engine components. 11.The mileage of the vehicle is improved.	1.5 1.5 1.5 1.5	1½x4 6	
7	1.Air bag 2.Anti lock braking system 3.Roll over protection 4.Electronic stability control 5.Self inflating tyres 6. Blind spot detection and parking aid with ultra sonic sensor.	1 1 1 1 1 1	1x6 6	
III a)	The process of mixing the vapour of a flammable hydrocarbon (such as gasoline) with air to form an explosive mixture especially for use in an internal-combustion engine.	2	8	15

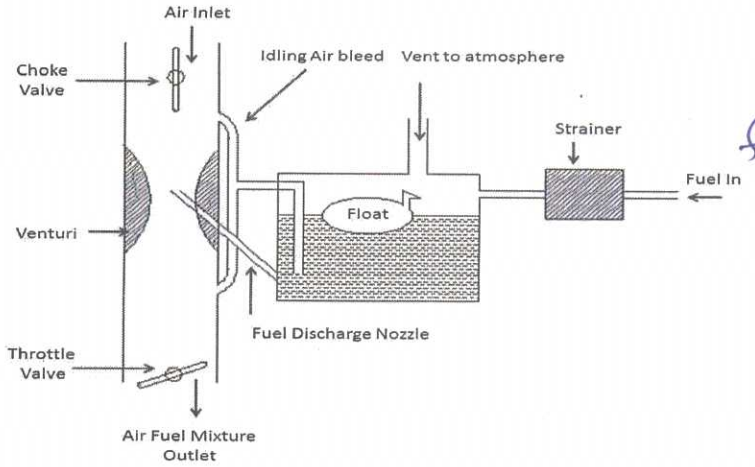


Fig 3

The Carburettor is nothing but a 'metal tubed structure' known as 'barrel' or 'venturi' that is narrower at the center. Thru' this tube, the air passes to the engine cylinders. When the air enters the carburetor, its velocity/speed is constant. However when the air reaches the narrower end, its velocity starts to increase. This narrow end of the tube acts as a speed-booster for the incoming air. The speed of the air reaches the maximum level at the narrowest point of the barrel. This is due to the narrowing space thru' which it must pass further. Once, the air passes the narrowest point, its velocity drops suddenly due to the immediate wider opening of the barrel.

Exp 3

This results in rapid drop in the pressure. Thus, it creates negative pressure. So, it allows the fuel pipe to lift the fuel from the carburettor's float chamber and spray it into the incoming air. Here, the fuel mixes with the air proportionately. Then, the mixture passes on to the engine cylinders thru' its intake manifold. Thus, the carburettor atomizes and vaporizes the fuel and mixes it with air according to engine's changing operating conditions.

Carburetion : 2 marks
Figure : 3 marks
Explanation: 3 marks

b

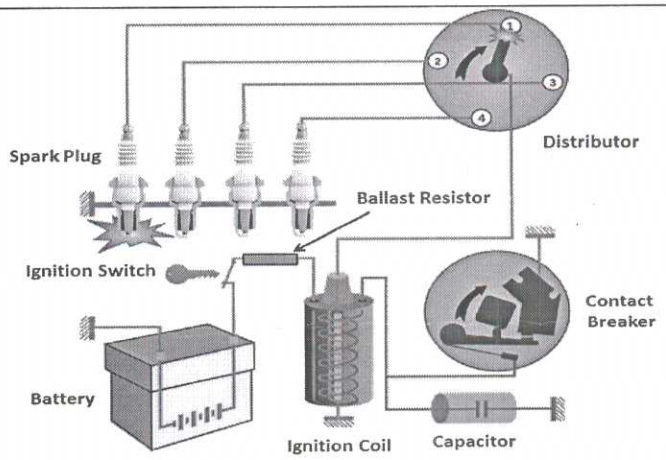
List: 3 marks
Explanation: 4 marks

1) Fuel tank
2) Fuel filter
3) Fuel feed pump
4) Fuel injection pump
5) Fuel injector
6) Governor

3

7

	Fuel Tanks There are many different types and shapes of fuel tanks. Each size and shape is designed for a specific purpose. The fuel tank must be capable of **storing enough fuel** to operate the engine for a reasonable length of time. Fuel Filters Diesel fuel must be filtered not once, but several times in most systems. A typical system might have three stages of progressive filters--a filter screen at the tank or transfer pump, a primary fuel filter, and a secondary fuel filter.(**to remove waste**) Fuel feed pump This pump, driven by the engine, **supplies fuel** automatically to the diesel injection system. The pump often has a hand primer lever for bleeding air from the system Fuel injector The job of the injectors is **to deliver a precise amount of atomized and pressurized fuel into each cylinder**. Highly atomized, pressurized fuel distributed evenly throughout the cylinder results in increased power and fuel economy, decreased engine noise, and smoother operation. Governor: To regulate engine speed and load.	4		
IV (a)	**Figure : 4 marks** **Explanation: 4 marks**		8	15



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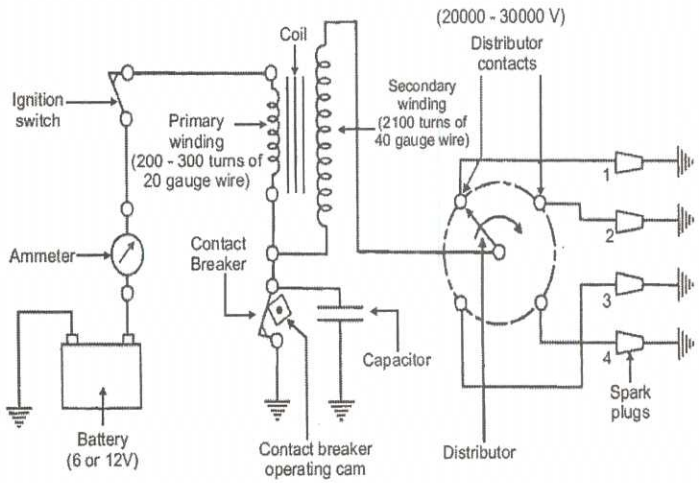


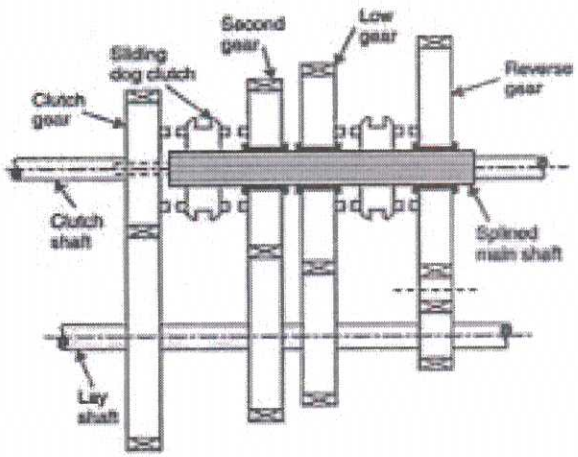
(Any one of these two figure)

A battery ignition system has a 6- or 12-volt battery charged by an engine-driven generator to supply electricity, an ignition coil to increase the voltage, a device to interrupt current from the coil, a distributor to direct current to the correct cylinder, and a spark plug projecting into each cylinder. Current goes from the battery through the primary winding of the coil, through the interrupting device, and back to the battery.

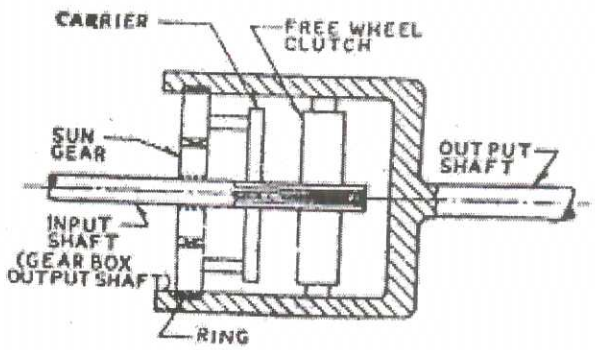
4

The secondary circuit consists of the secondary windings in the coil, the high tension lead between the distributor and the coil (commonly called the coil wire) on external coil distributors, the distributor cap, the distributor rotor, the spark plug leads and the spark plugs. As the engine rotates, the distributor shaft cam turns until the high point on the cam causes the breaker points to separate suddenly. Instantaneously, when the points open (separate) current flow stops through the primary windings of the ignition coil. This causes the magnetic field to collapse around the coil. The condenser absorbs the energy and prevents arcing between the points each time they open. This condenser also aids in

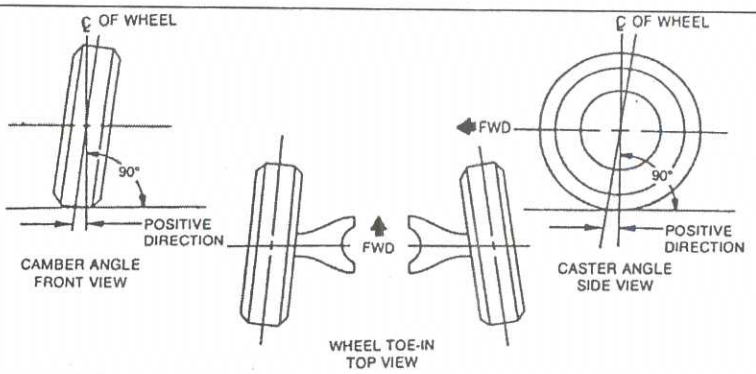
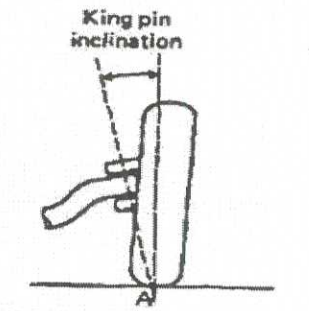
	the rapid collapse of the magnetic field. The line of flux in the magnetic field cut through the secondary windings of the ignition coil, creating a high voltage - high enough to jump the gaps between the rotor and the distributor cap terminals, and the electrodes at the base of the spark plugAs the distributor continues to rotate, electrical contact between the rotor and distributor cap terminal is broken, stopping the secondary flow. At the same time, breaker points close to the complete the primary circuit, allowing primary current to flow. This primary current will again create a magnetic field and the cycle is repeated for the next cylinder in the firing order.			
(b)	**Governing : 2 marks** **Types : 5 marks** **GOVERNING OF IC ENGINES** In automobile engineering, the term "Governing" means the action of varying the fuel supply in accordance with the load demands. The process of providing any arrangement, which will keep the engine speed constant (according to the changing load conditions), is known as governing of I.C. engines. Though there are many methods for the governing of I.C. engines. The following are important : **1. Hit and miss governing.** In this system of governing, whenever the engine starts running at higher speed (due to decreased load), some explosions are omitted or missed. This is done with the help of a centrifugal governor. This method of governing is widely used for I. C. engines of smaller capacity or gas engines. **2. Qualitative governing.** In this system of governing, a control valve is fitted in the fuel delivery pipe, which controls the quantity of fuel to be mixed in the charge. The movement of control valve is regulated by the centrifugal governor through rack and pinion arrangement.(CI ENGINE) **3. Quantitative governing.** In this system of governing, the quality of charge (i.e. air-fuel ratio of the mixture) is kept constant. But the quantity of mixture supplied to the engine cylinder is varied by means of a throttle valve which is regulated by the centrifugal governor through rack and pinion arrangement.(SI ENGINE)	2 5	7	

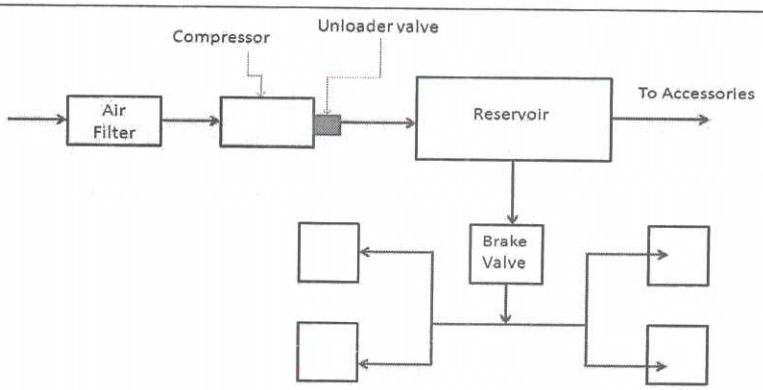
V (a)	**Figure : 4 marks** **Explanation: 4 marks**  Constant Mesh Gear Box Constant mesh gearbox is a type of Transmission in which all or most of the gears are always in mesh with one another, as opposed to a sliding-gear transmission, in which engagement is obtained by sliding some of the gears along a shaft into mesh. In a constant-mesh manual gearbox, Gear ratios are selected by small Clutches that connect the various gear sets to their shafts so that power is transmitted through them. Constant gear mesh gearbox employed helical gears for power transmission. The gears are rigidly fixed in the lay shaft. The gears in output shaft rotate freely without engaging with shaft, thus not transmitting power. The gears in both shafts are always meshed together. To engage the gears with output shaft dog clutch is used. The dog clutch is shifted by the selector fork moved by gear lever. To provide reverse gearing a idler gear is used.	4 4	8	15

(b)	**(Any seven points)** 1. It should be able to transmit maximum torque of the engine. 2. It should engage gradually to avoid sudden jerks. 3. It should be able to dissipate large amount of heat generated during clutch operation. 4. It should be dynamically balanced, particularly in the case of high speed engine clutches. 5. It should have suitable mechanism to damp vibrations and to eliminate noise produced during power transmission. 6. It should be as small as possible so that it will occupy minimum space. 7. It should be easy to operate requiring as little exertion as possible on the part of the driver. 8. It should be made as light as possible so that it will continue to rotate for any length of time after the clutch has been disengaged. 9. It must be trouble free and have longer life. 10. It must be easy to inspect, adjust and repair.	1 1 1 1 1 1 1	7	
VI (a)	**Functions: 4 marks** **Classification: 4 marks** **Rear axle** is the last member of power train. In most of automobiles, real **axle** is the driving **axle**. It lies between the driving wheels and the differential gear and transmit power from the differential to the driving wheels. It consists of two half shaft connected to the differential gear, one for one wheel. The rear axle mainly performs following **functions**. 1. It carries the weight of the vehicle. 2. It rotates and transmits the power from the engine to the wheels. 3.It acts as an axis for the wheel 4. It acts as a housing and support for final drive, differential	4	8	15

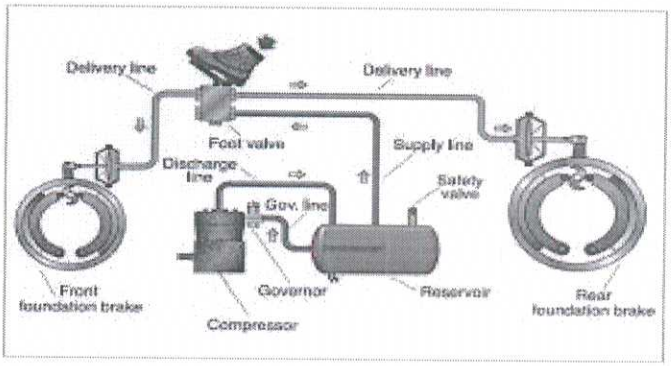
	and axle shafts. Rear axles differ on the basis of method of supporting them and mounting of rear wheels. On this basis, these axles can be classified into three types. 1. Fully floating rear axle 2. Three quarter floating rear axle 3. Semi floating rear axle In a half floating rear axle, the axle is at the centre of the axle casing and the bearings are inside the axle casing. The weight of vehicle is transmitted first to suspension spring, then to axle casing, then to axle and finally to ground. In three quarter floating rear axle, bearings are on the outer side of axle casing, i.e. between casing and wheel. In this case, ma ✓ or part of vehicle weight is taken by axle casing and not by axle. This is the main advantage of three quarter floating type over half floating type. Thus, axle break down is less in this case compared to the previous type. In fully floating type, the wheel hub is fixed on the axle tube. In which complete load is taken by axle tube. This type of axle is very strong and used for heavy vehicles.	4		
(b)	**Figure :4 marks** **Explanation :3 marks**  cut-away view of the overdrive. • An overdrive is a mechanism that allows an automobile to cruise at sustained speed with reduced engine RPM, leading to better fuel economy, lower noise, and lower wear. • It is mounted at the rear end of the gearbox. • The gear ratio provided by an overdrive unit is 30% more	4 3	7	

	than the direct top gear. • The unit consists of an epicyclic gear train. • The planet carrier is connected to the output shaft of the gear box. • When the sun gear is locked to the output shaft of the gear box, the planet carrier rotates about the sun gear. • The ring gear rotates more slowly than planet gear thus giving more ratio than the direct drive. • Overdrive is used in some sports cars and luxury cars.			
VII (a)	**Camber: 2 marks** **Caster: 2 marks** **Toe in: 2 marks** **Kingpin inclination: 2 marks** **Caster** is the fore or aft slope of the steering axis. The steering axis is a line drawn through the upper and lower ball joints of the knuckle. Positive caster is when the bottom of the steering axis line is in front of the tire's contact patch. Zero caster is when the steering axis is at 0 degrees. Factory alignment specs for basically all vehicles call for a certain degree of positive (shown) caster. This ensures good stability, helps maintain straight-ahead direction and promotes steering wheel self-centering. **Camber** is the inward or outward tilt of the front tires as viewed from the front. Inward tilt is negative, outward tilt is positive. Camber is used to distribute load across the entire tread. Improper camber makes the tire wear on one edge, and causes the vehicle to pull to the side that has the most positive camber. **Toe** is the side-to-side difference in distance between the front and rear of the front tires. If the distance is closer at the front, it's called toe-in. If the difference is closer at the rear, it's called toe-out. SAI is also known as **kingpin inclination** (KPI) and is the imaginary line drawn through the **kingpin** as viewed from the front. The purpose of SAI is to provide an upper suspension pivot location. That causes the spindle to travel in an arc when turning, which tends to raise the vehicle.	2 2 2 2	8	15

	  Wheel pivots about its point of contact with road A			
(b)	1. Low unsprung weight. 2. Better Handling and Cornering 3. Softer suspension compared to rigid type. 4. Better ride quality. 5. Improved vehicle stability and Steering 6. Overcomes the ill-effect on steering geometry. 7. More space to accommodate the engine.	1 1 1 1 1 1 1	7	
VIII (a)	**Figure :4 marks** **Explanation :4 marks**		8	15



Layout of Air Brake System



(Any one of two diagram)

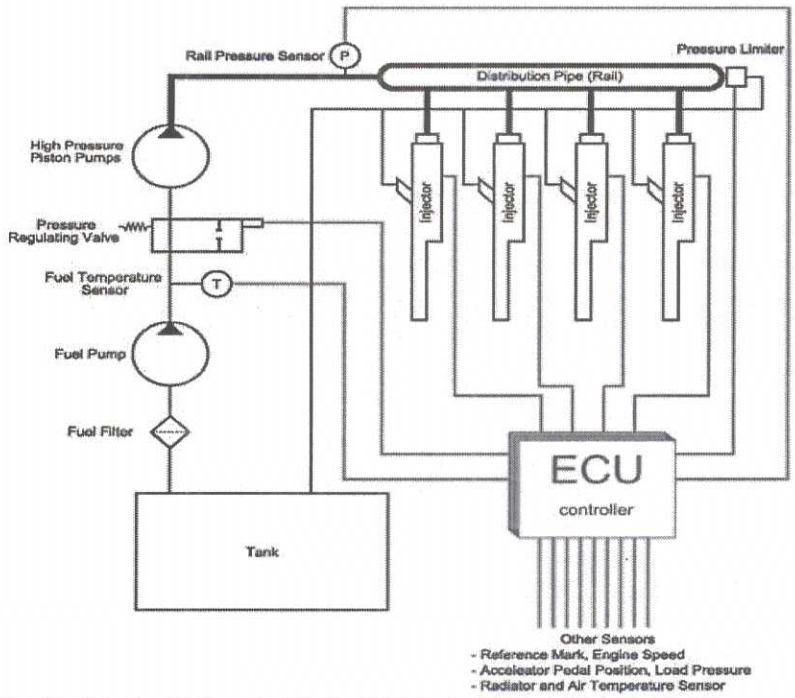
The pneumatic brake is uses in heavy vehicle where large braking force is required to stop the vehicle. In Pneumatic braking system the compressed air is used to operate the brake shoes toward the drum to slower down or stop the vehicle. It consists of a compressor which sucks the air from atmosphere through a filter element. The compressed air is store in a reservoir with a unloader valve which sets or control the pressure of compressed air in the reservoir. From the reservoir the compressed air send to the brake valve which is controlled by the driver when the braking action is performed. The amount of opening or closing the brake valve controls the braking force acting on the brake shoes toward drum. Applying of brake causes the decrease in pressure in the reservoir and the compress air is filled in the reservoir through unloader valve. The hose pipe or delivery pipe is used to deliver the compressed air from the compressor to the brake shoes.

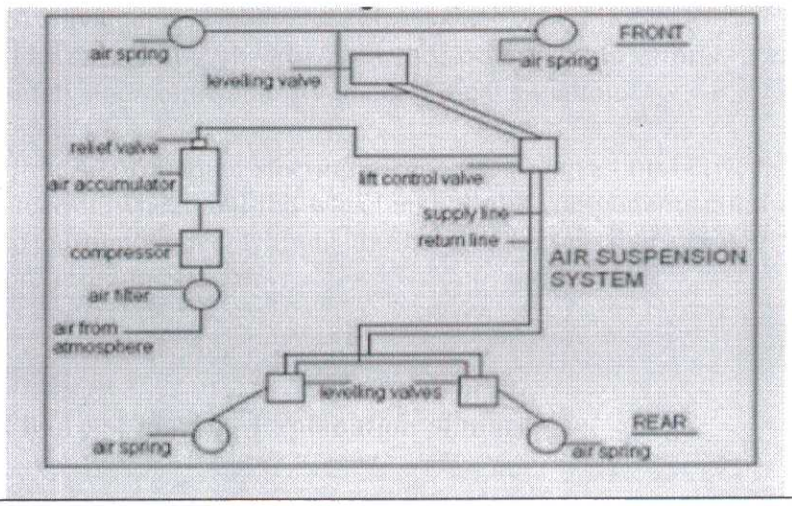
4

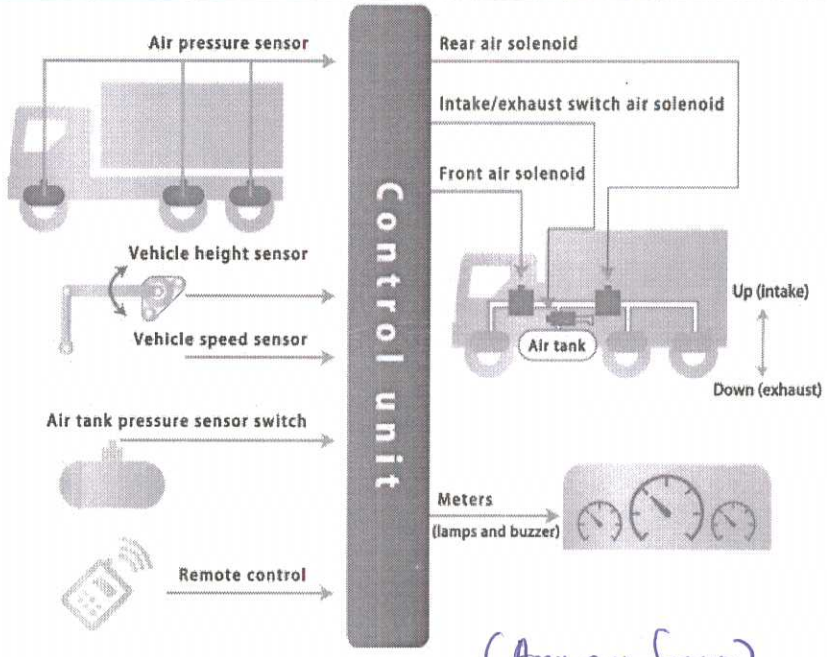
4

(b)	TUBE TYRE vs TUBELESS TYRE (**Any seven poins**) 1.A tube inside a tire would simply collapse in case of puncture and the air in the tyre goes out in no time. Tubeless tyre retains air pressure and helps avoid sudden air	1	7	

	loss in the case of a puncture. 2. Fuel EfficiencyTube tyres are not so fuel efficient when compared to tubeless tyres. Tubeless tyres are more fuel efficient. 3. WeightTube tyres weigh more because of the tube placed inside them. Tubeless tyres are light weight because of no tube inside the tyre. 4.In case of punctureThe tube in the tube tyres will explode suddenly in case of puncture causing loss of control of the vehicle which may result in accidents. Tubeless tyres make driving safe and easy and there is no loss of control of the vehicle in case of puncture. 5.Repair ProcessThe puncture repairing process of tube tyre involves a complicated process of removing the tyre from the vehicle and removing tube from the tyre, etc. The puncture repairing process of a tubeless tyre can be done without removing the tyre and is very simple compared to a tubed tyre. 6.Cost of TyreThe tube tyres are of less cost and are available in every size for every vehicle. The tubeless tyres are costly and are not available for all types of vehicles. 7.PuncturesThe tube tyres are more prone to punctures because of the tubes placed in them. The tubeless tyres are durable and last longer because of no tube is placed in them. 8.Repair CostThe tube tyre puncture repair cost is less when compared to that of the tubeless tyre. The tubeless tyre puncture repair cost is very high and can be repaired instantly.	1 1 1 1 1 1 1		
IX (a)	**Figure :4 marks** **Explanation :4marks** CRDI or common rail direct injection system is a method of injection of fuel into the engine cylinders of petrol and diesel engines.In the engines, a high pressure common rails used to inject the fuel in individual valves.In the modern generation engines this fuel injection system is used mostly because of technological advancement.In this method a common and single line is used to inject the fuel. This common line is connected to all the fuel injectors in the system, this common line is known as common rail The ECU (electronic control unit) control the pressure as per the requirement. ECU uses sensors on the crankshaft and cam. The injection pressure is controlled or regulated on the factors	4	8	15

	like engine speed and load.The whole process makes the injection to be happened as per the requirement. It makes the system efficient, economical eco-friendly The working process of CRDI is very simple to understand as given below- ▪ In the process of CRDI a pump is used to pressurize the fuel. ▪ After the compression of fuel in the high pressure pump, the fuel is supplied to the common fuel rail. ▪ Then the fuel will be distributed to the different injectors. ▪ Injectors will finally inject the fuel in the engine cylinders.  	4		
b.	**(Any seven points)** 1). Power steering is a system that helps in steering the wheels using some source of power. .Manual steering is a system in which manual force is used for steering. 2) <u>Mechanism</u> .Hydraulic Power steering: rack and pinion, recirculating ball and nut, worm and roller, hydrostatic valve. Electrical Power steering: Rack and pinion, column driven EPS, pinion driven EPS, Rack driven EPS	1 1	7	

	.A manual steering uses a rack and pinion, worm and roller and recirculation ball and nut. 3) Response .Power steering is Comparatively quick .Manual steering Comparatively slow resistance to wheel movement 4) .Power steering vehicles are comparatively heavy weight vehicles .Manual steering vehicles are low weight vehicles 5).Elements of power steering include A hydraulic pump, fluid reservoir, hoses, lines; and either a power assist unit mounted on, or integral with, a power steering gear assembly. .Manual steering includes steering wheel and column, a manual gearbox and pitman arm or a rack and pinion assembly, linkages; steering knuckles and ball joints, and the wheel spindle assemblies 6) Advantages .Power steering absorbs road shocks, minimum efforts, greater safety and controllability under critical situations. .In case of manual steering mechanical connection between the steering wheel and the wheel and all the components continues to be maintained without the help of the auxiliary power and preferred in race cars 7). Power steering is costly.	1 1 1 1 1 1		
X (a)	**Figure :4 marks; Explanation :4 marks**  		8	15



4

(Any one figure)

Air suspension is a type of vehicle suspension powered by an electric or engine-driven air pump or compressor. This compressor pumps the air into a flexible bellows, usually made from textile-reinforced rubber. The air pressure inflates the bellows, and raises the chassis from the axle.

Air springs are basically installed on the rear and front axles. The incoming air is first passed through the filter, where the dust is filtered and then the air is passed into the compressor. Here, the air is compressed and its pressure increased from the atmospheric pressure up to about 250 MPa. Then this pressure is sustained in the accumulator tank. This accumulator has a safety relief valve, which acts as a safety device by opening when the air pressure goes above 250 MPa. The air is then conveyed to control valve and then through levelling valves up to the air springs. Air springs are categorized into two types: Piston type and Bellow type. In electronic suspension system achieves control by means of an electronic control unit (ECU) which actuates the air bellows via solenoid valves, using information received from sensors. ECU adjusts the loading platform height according to the load to keep this air suspension system, and excellent vibration absorption performance. The height and tipping angle of the loading platform can be adjusted as desired to facilitate loading and unloading operations. The ECU also comes with a memory function for storing loading platform height information, axle load control to facilitate starting the vehicle when it's unloaded, a load calculator, and other user-friendly functions.

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(b)	**Automatic Transmission : 3 marks** **Advantages : 4 marks** Automatic Transmission is a type of transmission which changes the ratio of the gear of your vehicle automatically. In this, driver doesn't need to change the gear after every particular time gap. The most popular form found in automobiles is the hydraulic automatic transmission. This system uses a fluid coupling in place of a friction clutch, and accomplishes gear changes by hydraulically locking and unlocking a system of planetary gears. Besides the traditional hydraulic automatic transmissions, there are also other types of automated transmissions, such as a continuously variable transmission (CVT) and semi-automatic transmissions, that free the driver from having to shift gears manually, by using the transmission's computer to change gear.	3		
(b)	Advantages **(Any four Advantages)** o **Easier to use** – Although there's nothing inherently difficult about shifting gears and working a clutch, it still takes a bit of practice before most drivers are comfortable learning to use each of their limbs independently in order to control a manual transmission vehicle. Automatic transmissions, by comparison, are much simpler and take drivers significantly less time to learn. o **Less manually restrictive** – Most new drivers are taught that the safest way to drive is to keep both hands firmly on the wheel at all times. This is possible when driving an automatic transmission vehicle, but is not possible with a manual transmission. o **Better for hilly areas** – If you're a less experienced driver, you may find that navigating steep inclines in a manual transmission is difficult, especially if you're attempting to do so from a dead stop. Automatic transmissions take care of this issue, enabling your car to operate efficiently no matter how steep the hill might be. o **Greatly reduced risk of stalling** – There are few things more embarrassing and awkward than accidentally stalling your vehicle right when the traffic light changes. This isn't a common problem for those driving automatic transmission, where stalling will only occur if there's a mechanical problem in the vehicle. o **Easier to use in heavy traffic** – Overall, more work goes into starting, accelerating, decelerating, and	4	7	

	stopping manual transmissions. This isn't normally a problem, but in heavy traffic where a car isn't able to get up to speed, drivers may notice that the constant starting and stopping becomes a difficult chore. Automatic transmissions allow the driver to move through heavy traffic without having to do more than push a single pedal.			