SUMMER– 18 EXAMINATION

Subject Name: Automobile Systems and Body Engineering **Subject Code:** 17409

Model Answer

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 judgement 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.

Q. No.	Sub Q. N.	Answers	Marking Scheme
1	a)	**Attempt any SIX of the following**	12
	(i)	**Define Live axle and Dead axle**	02
	Ans	**1. Live front axle:** It is axle which contains differential mechanism through which the engine power flows towards the front wheels. **2. Dead front axle:** It has no connection with engine means it is dead and will not carry the engine power.	01 01
	(ii)	**State friction materials used for brake shoes**	02
	Ans	Friction materials used for brake shoes: 1. Asbestos 2. Ferodo 3. Cork 4. Leather	02
	(iii)	**Write applications of torsion bar**	02
	Ans	Torsion bar is used with leaf springs on chrysler cars, Santro with coil spring and alone with Volkswagon cars and Racings cars, buses, trailers and HCVs to avoid the tendency of rolling.	02
	(iv)	**State two functions of parking brakes**	02
	Ans	i) This is an auxiliary brake (a non-service brake) used to work when the vehicle is either moving on a long downhill gradient, or in busy traffic where it has to slowdown continuously over a large distance. This type of brake effects fuel economy of vehicle. ii) It is the secondary braking system used to hold the car in stationary position when parked on a slope. By using emergency brake, vehicle can be brought to a complete stop if there's a failure of the brake system.	01 01

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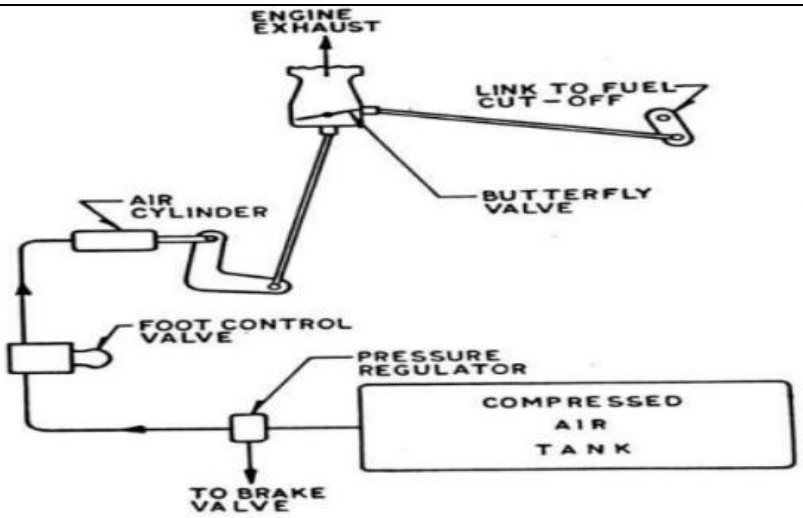
	(v)	**Define Tractive efforts and yaw**	02
	Ans	**Tractive effort:** Tractive effort is the force available at the points of contact between the rear wheel tyres and the road. Therefore, the useful tractive effort is always less than the traction. **Yaw:** It is the turning movement of the body around the center point of the vehicle. Yaw occurs as the vehicle corners. If the cornering speed is too high, the transfer of weight can cause the vehicle to spin.	01 01
	(vi)	**Write the materials used in body construction**	02
	Ans	**Materials used for body construction**: *(Any 04)* 1) Steel 2) Alloy steel 3) Aluminum 4) Plastic □ Thermoplastic □ Thermosetting plastic □ Glass reinforced plastic 5) Fiber glass 6) Wood 7) Glass 8) Rubber	02
	(vii)	**List the type of refrigerants used in car air conditioner**	02
	Ans	**Type of refrigerants used in car air conditioner:** R-134a:Tetrafluoroethane R-152a: Difluoroethane R-1234yf: Tetrafluoroethane R-744: Carbon dioxide	Any 04- 02 marks
	(viii)	**Name the components of steering system used in case of car**	02
	Ans	**Components of power steering system:** ***(Any 04- ½ mark each)*** 1. Hydraulic pump, 2. Hydraulic control valve, 3. Fluid reservoir, 4. Rack & pinion gear box, 5. Steering shaft, 6. Steering wheel. 7. Steel pipe lines, unions and flexible hoses	02

	b)	**Attempt any TWO of the following**	08
	(i)	**Explain working of exhaust brake with neat sketch**	04
	Ans	 Schematic diagram showing engine exhaust brake. **Working**:-It consists of pressure regulator, Foot control valve, Air cylinder, Butterfly valve and Linkages. In it, the pressure regulator is common with the air (service) brake When the exhaust gas brake is to be applied, the driver presses upon the control valve by his foot. This allows flow of compressed air from the air cylinder, which in turn operates the linkage to close the butterfly valve at the exhaust manifold. It prevents exit of the exhaust gas into atmosphere and diverts it to apply the brakes. As soon as the foot is taken- off the foot control valve, the brake is released. In this way, this type of brake effect fuel economy of vehicle.	02 02
	(ii)	**Explain construction and working of telescopic shock absorber**	04
	Ans	**Construction:** The telescopic shock absorber is shown in fig its upper eye is connected to the axle and the lower eye to the chassis frame. A two way valve A is attached to a rod another two way valve B is attached to the lower end of cylinder the fluid is in the space above and below the valve A and also in the annular space between the cylinder and tube which is connected to the space below the valve B the heat has a gland. Any fluid scraped off by the rod is brought down into the annular space through the inclined passage. **Working**: When the vehicle comes across a bump the lower eye moves up. Therefore the fluid passes from the lower side of the valve A to its upper side but since the volume of the space above valve A is less than the volume of the rod the fluid exerts pressure on the valve B. This pressure of the fluid through the valve opening provides the damping force. Similarly when the lower eye moves down the fluid passes from the upper side of the valve A to the lower side and also from the lower side of the valve B to its upper side.	01 01

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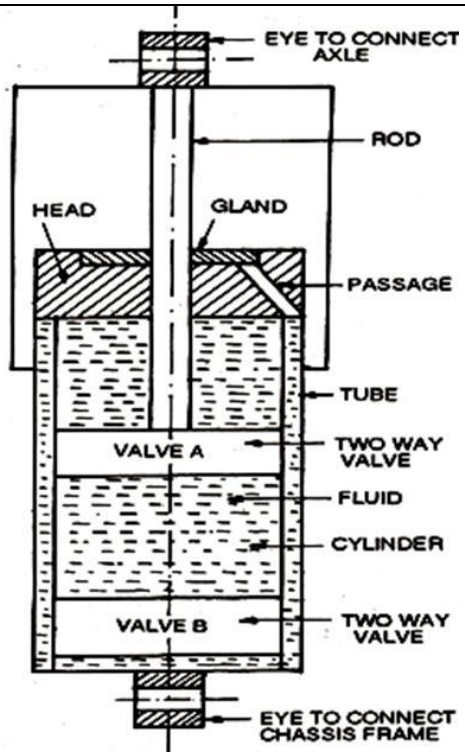
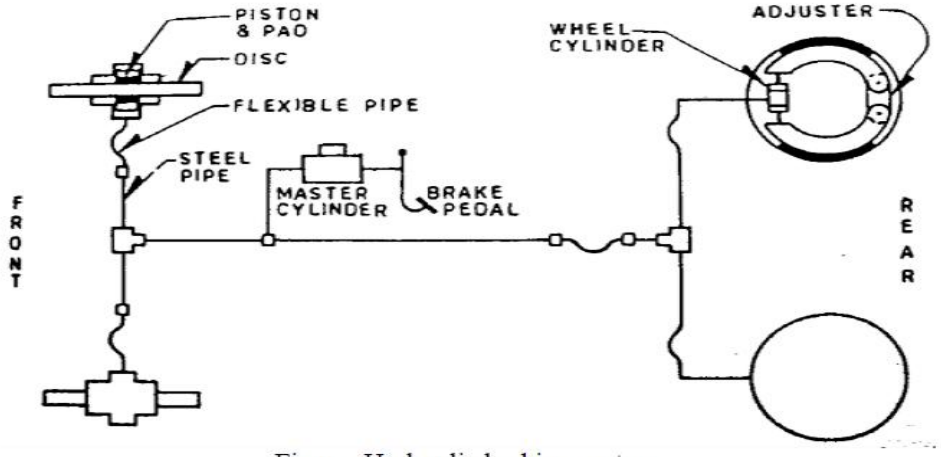
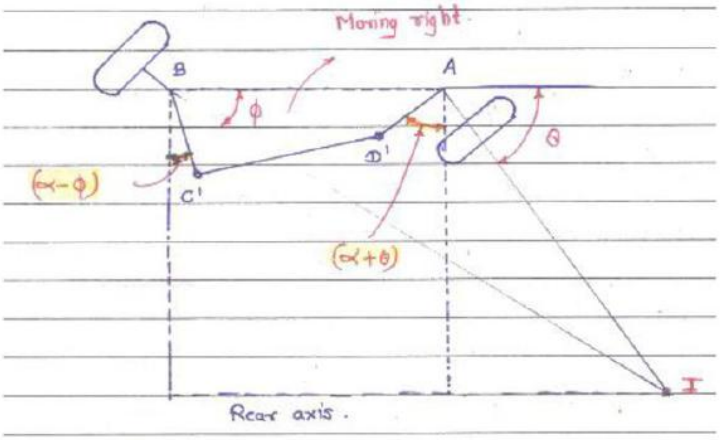
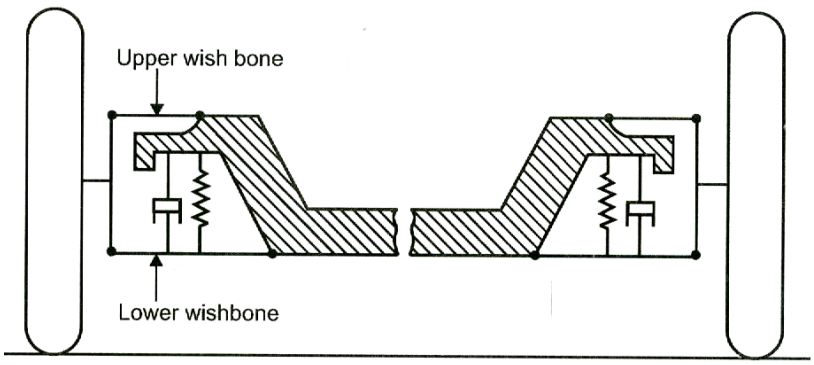
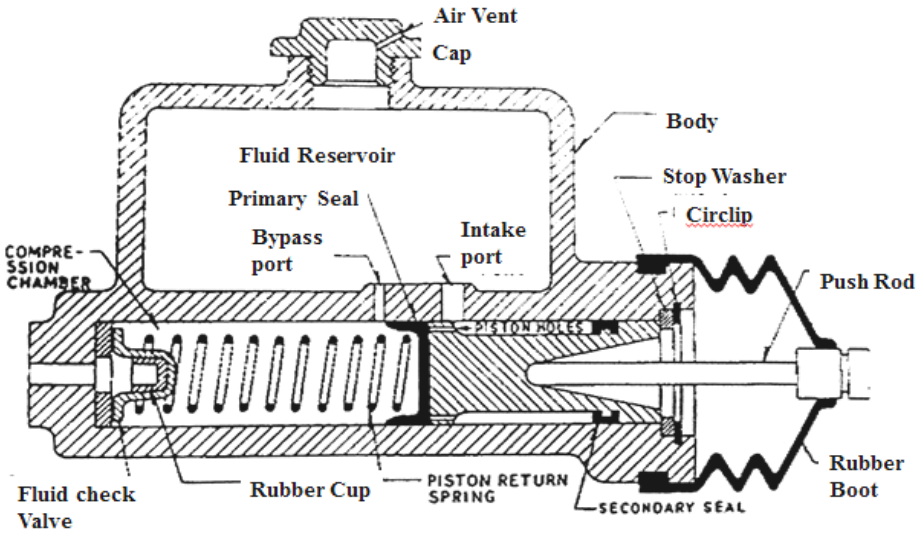
		 **Figure: Telescopic shock absorber**	02
	(iii)	**With neat sketch explain working of hydraulic brake system**	04
	Ans	**Answer: Working of a hydraulic brake system:**  Figure: Hydraulic braking system. **Working:** When the brakes are not in operation, the system is filled with brake fluid under light pressure. When driver presses the brake pedal for applying the brake, the piston in the master cylinder moves forward and compresses the fluid in cylinder. It increases the pressure of the fluid in master cylinder and in entire hydraulic system. This pressure is instantly transferred to all four wheel cylinders (in case of disc brake this pressure is transferred to calipers). Thus the piston in wheel cylinders moves outward which moves brake shoes against brake drum to apply brakes. When driver releases the brake pedal, the master cylinder piston returns to its original position due to return	02 02 02

		spring and the pressure is dropped. It releases brake shoes from brake drum to their: original position and brakes are released.	
2		**Attempt any four of the following**	16
	a)	**Explain the Ackerman steering mechanism with neat sketch**	04
	Ans	The Ackermann steering gear consists of turning pairs rather than sliding pairs. The whole of the mechanism is placed on the back of the front wheels. In Ackermann steering gear, the mechanism ABCD is a four bar crank chain. The shorter links BC and AD are equally inclined to the longitudinal axis of the vehicle. For the correct steering the following three positions are obtained: 1. When the vehicle moves along the straight path, the longer links AB and CD are parallel at Shorter links BC and AD are equally inclined to the longitudinal axis of the vehicle. 2. When the vehicle is moving to the right or left, the lines of the front wheel axle intersect on the back wheel axle at I for correct steering.  Figure: Ackerman steering linkage.	02 02
	b)	**Draw a neat labeled sketch of wishbone type independent suspension system**	04
	Ans	**Independent suspension system: (Diagram: 03 Marks & Correct Labeling : 01 Marks)**  Fig. Wishbone type independent suspension	04

	c)	**Explain painting procedure of new vehicle in brief**	04
	Ans	**Procedure of painting:** 1) Thoroughly wash the vehicle. 2) Carryout protective and anticorrosive treatment. 3) Spray a thin coat of primer. Allow to dry for 15 min. 4) Apply three full coats of surfacer allowing 10 – 15 minutes between the coats. 5) Allow it to dry for 1 hour. Then wet flat with P 600 grade paper. 6) Apply stopper (putty) wherever necessary allowing 15 to 20 minutes between the layers. 7) Allow to dry for 1 to 1½ hours. Wet flat stopper with 320 wet paper. 8) Spray surfacer to stop up areas and flat with P 600 grade paper. 9) Blow off vehicle with air gun and tack off. 10) Spray finishing material, apply one coat and allow it to dry for 15 to 30 minutes. Then apply second coat. 11) Allow overnight drying. Wet flat with P 800 grade paper and dry with air gun. 12) Spay double header coat.	04
	d)	**Describe the human comfort conditions**	04
	Ans	**Human comfort conditions used in car Air conditioner:** 1) **Temperature:** Temperature is the most important factor which affects human comfort to a great extent. Most of the human being feels comfortable at a temperature 21^0C to 25^0C. Generally human being feels comfortable at relatively higher temperature in winter season and feels comfortable at relatively lower temperature in summer season. The comfort temperature of individual person depends on his body structure, eating habits, the area in which he is to make familiar to live. 2) **Humidity:** The control of humidity is not only necessary for human comfort but it is also important from point of view of efficiency of driver. For human comfort, relative humidity is kept within a range of 35% to 60%. 3) **Purity of air:** A person does not feel comfortable when breathing in contaminated air even if temperature and humidity is within comfortable range. Therefore, proper filtration, cleaning and purification of air is necessary to keep it free from dust, dirt and other impurities. The proper percentage of oxygen in air is necessary to be maintained for human comfort. Therefore, proper filtration system is provided in HVAC system in automobiles. 4) **Air motion and circulation:** Even if temperature, humidity and purity of air is satisfactory, certain amount of air motion is necessary for human comfort. We do not feel comfortable in dead or still air. It is therefore, necessary that there should be equi-distribution of air throughout the space to be air conditioned.	01 01 01 01

	e)	**Describe construction and working of master cylinder**	04
	Ans	 Figure: Master Cylinder. *(Note: Equivalent credit shall be given to schematic diagram if drawn)* **Construction:** There are two main chambers viz. the fluid reservoir and compression chamber in which the piston operates. There are rubber seals on both ends of the piston in the compression chamber. The reduced diameter region of the piston is always surrounded by the fluid. A rubber boot covers the push rod end of the master cylinder to prevent the dust from entering inside. Towards the brake line side of the compression chamber, there is a fluid check valve with a rubber cup inside. **Working:** The push rod is operated with the foot brake pedal through linkage. As the pedal is pressed, push rod moves the piston to the left against the force of the spring till it covers the bypass port. Further movement f the push rod causes building up of pressure in the compression chamber. Finally, when sufficient pressure has built up, the inner rubber cup of the fluid check valve is deflected, forcing the fluid under pressure in the lines. This fluid enters the wheel cylinder or the caliper and moves the piston thereby applying the brakes.	02 01 01
	f)	**Explain correct steering angle and turning radius**	04
	Ans	**Correct steering angle:** Equation for correct steering is $\cot\varnothing - \cot\theta = b/l$ Where, Ø = angle between line passing through front outer wheel center and instantaneous center and rear wheel and instantaneous center. θ = angle between line passing through front inner wheel center and instantaneous center and rear wheel and instantaneous center. *b* = distance between the pivots of front axle. *l* = wheel base The value of $\cot\varnothing - \cot\theta$ corresponds to the position when steering is correct. There are three values of angle θ which give correct steering of the vehicle, first while it is turning to right, second while it is turning to left and third while it is running straight. **Turning radius:** It is the radius of circle on which the outside front wheel moves when the front wheels are turned to their extreme outer position. Cars have turning radius from 5.38 to 7.85 m whereas in the case of trucks it is as high as 13.85m.	02 02

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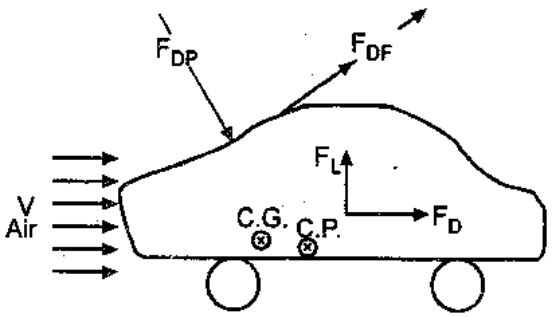
3		**Attempt any four of the following**	16
	a)	**Write any two advantages and disadvantages central locking**	04
	Ans	**Advantages of central locking system: (Any 02)** 1) All the doors and luggage compartments can be locked or unlocked simply by operating one key. 2) It Indicates open door with flash 3) Locking/ unlocking can be done by remote 4) In case of failure of electronic system, the manual locking is still possible. **Disadvantages of central locking system: (Any 02)** 1) It is not convenient in case of accident because occupant may not open the door in emergency since all doors are centrally locked. 2) It's initial and maintenance cost is high.	04
	b)	**List four properties of refrigerant**	04
	Ans	**Properties of refrigerant: (Any 04- 1 mark each)** 1) The refrigerant should have low freezing point. 2) It must have high critical pressure and temperature to avoid large power requirement. 3) It must have low specific heat and high latent heat. 4) It should have low specific volume to reduce the size of the compressor. 5) It must have high thermal conductivity to reduce the areas of heat transfer in Evaporator and condenser. 6)It should be non-inflammable, non-explosive, non-toxic and non-corrosive. 7)It should give high C.O.P. in the working temperature range. This is necessary to Reduce running cost of the system. 8) It must be readily available and it must be cheap also.	04
	c)	**Explain concept of stream line shape of vehicle body**	04
	Ans	**Answer: Concept of streamlining:** When the vehicle moves along the road, it faces various forces applied by the air, known as aerodynamic forces. The major effects of these aerodynamic forces on vehicle performance are: Aerodynamic Drag (Induced drag, Profile drag, Friction drag) and Aerodynamic Lift. To reduce the air resistance during running, the body of motor vehicle is so shaped that is streamlined. An arbitrary shape body of vehicle experiences a large air resistance. This leads to loss of power required for propulsion. This implies a need of aerodynamic considerations for designing a body. So the profiling or shaping of the vehicle body to reduce air resistance as vehicle moves forward is called streamlining. **The various aerodynamic forces acting on the vehicle body are shown in Fig.**  F_L = Lift forces F_D = Drag forces F_{DP} = Pressure drag force in normal direction F_{DF} = Friction drag force in tangential direction C.G. = Centre of gravity C.P. = Centre of pressure OR	02 02

		When the vehicle moves along the road, it faces various forces applied by the air, known as aerodynamic forces. The major effects of these aerodynamic forces on vehicle performance are: Aerodynamic Drag (Induced drag, Profile drag, Friction drag) and Aerodynamic Lift. To reduce the air resistance during running, the body of motor vehicle is so shaped that is streamlined. An arbitrary shape body of vehicle experiences a large air resistance. This leads to loss of power required for propulsion. This implies a need of aerodynamic considerations for designing a body. So the profiling or shaping of the vehicle body to reduce air resistance as vehicle moves forward is called streamlining.	04
	d)	**State the advantages of gas filled shock absorber over conventional type**	04
	Ans	**Advantages of gas filled shock absorber over conventional type:** 1. The tolerance to heat is greater in gas filled shock absorber over conventional type 2. A gas filled shock absorber is designed to reduce foaming of oil so that the efficiency of the shock absorber remains constant throughout 3. By using gas filled shock absorber reduces excessive vibrations 4. Gas filled shock absorber provides improved performance levels over a wider verity of road conditions. 5. Overall efficiency of Gas filled shock absorber is greater than conventional type	Any 04
	e)	**Explain necessity of humidity control**	04
	Ans	Human feels comfortable at 60% humidity if the humidity is higher he feels sweating and if lower he feels dryness in various organs. Some people experience difficulty breathing in high humidity environments. Some cases may possibly be related to respiratory conditions such as asthma, while others may be the product of anxiety. Humans are sensitive to humid air because the human body uses evaporative cooling as the primary mechanism to regulate temperature. Under humid conditions, the rate at which perspiration evaporates on the skin is lower than it would be under arid conditions. Because humans perceive the rate of heat transfer from the body rather than temperature itself, we feel warmer when the relative humidity is high than when it is low. Hence there is necessity to control humidity in car air conditioning.	04
	f)	**Explain working of disc brake with neat labeled sketch**	04
	Ans	**Answer:** **Working of Disc Brake:** In a disc brake, the fluid from the master cylinder is forced into a caliper where it presses against a piston. The piston in turn crushes two brake pads against the disc that is being attached to wheel, making it to stop or slow down. Main advantage of disc brakes is their resistance to wear as the discs remain cool even after repeated brake applications.	02

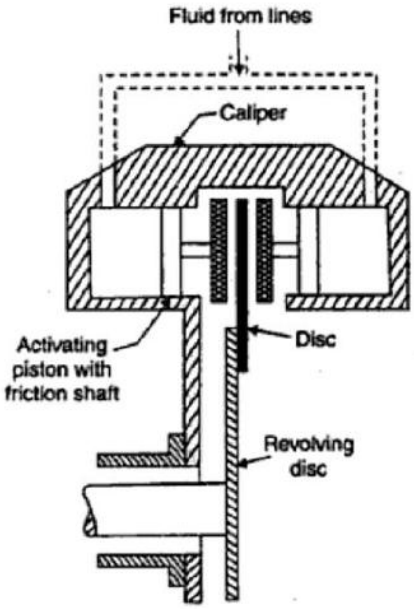


Figure: Disc Brake.

02

04		**Attempt any TWO of the following**	16
	a)	**Draw layout of HVAC and explain its operation**	08
	Ans	**(Diagram: 02 Marks & Correct Labeling : 02 Marks)**	04

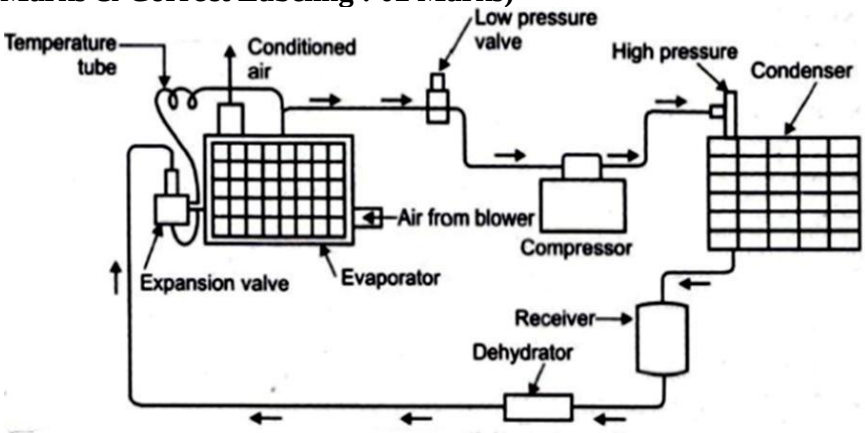
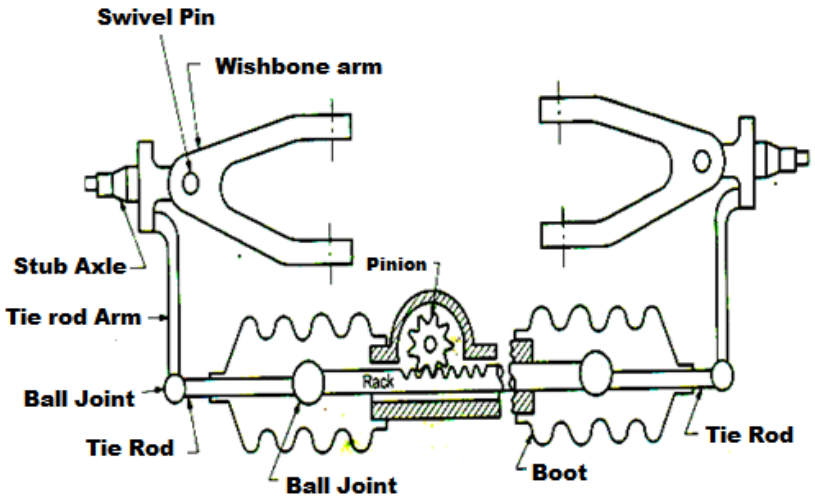


Figure. Car Air-Conditioning System

Operation of HVAC: HVAC works on Vapor compression cycle. It consists of compressor, condenser, evaporator, receiver, expansion valve, thermostat, blower fan and heating core. In compressor during suction stroke low pressure vapor in dry state is sucked from evaporator. It is then compressed to high pressure and temperature. These vapors are then passed into condenser where heat is removed by cooling medium which converts vapor into liquid. The liquid is stored into receiver. The liquid from receiver is then passed to evaporator through expansion valve. Expansion valve reduces pressure. The low pressure liquid refrigerant enters evaporator, where it absorbs the heat from the warm air which is passed over the evaporator. The worm air gets cooled thereby cooling the passenger compartment. Due to heat absorption, liquid refrigerant gets converted into

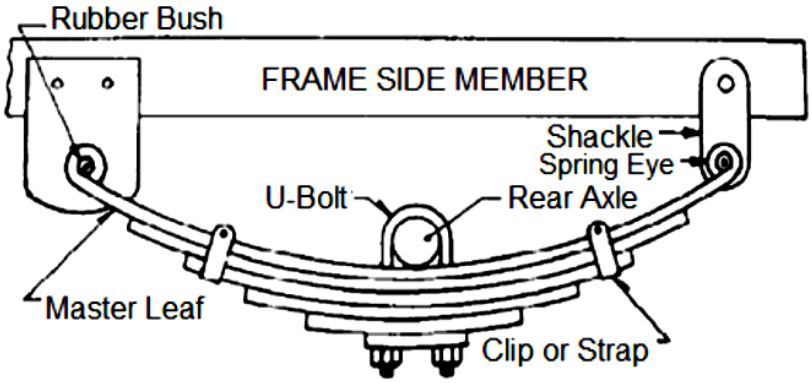
04

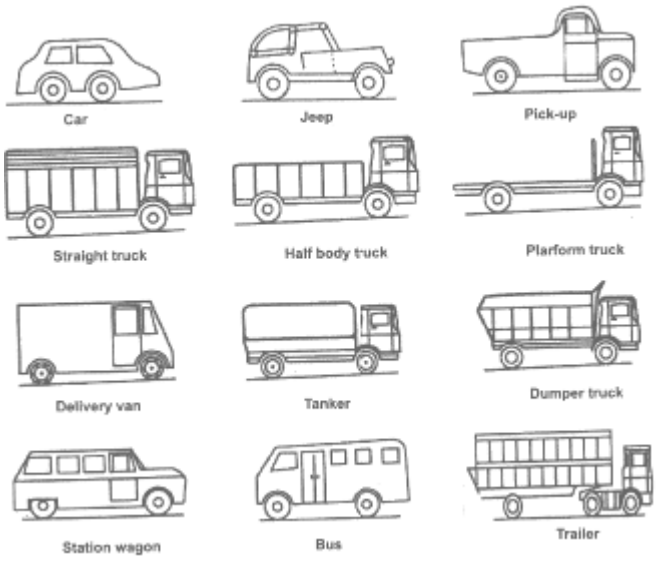
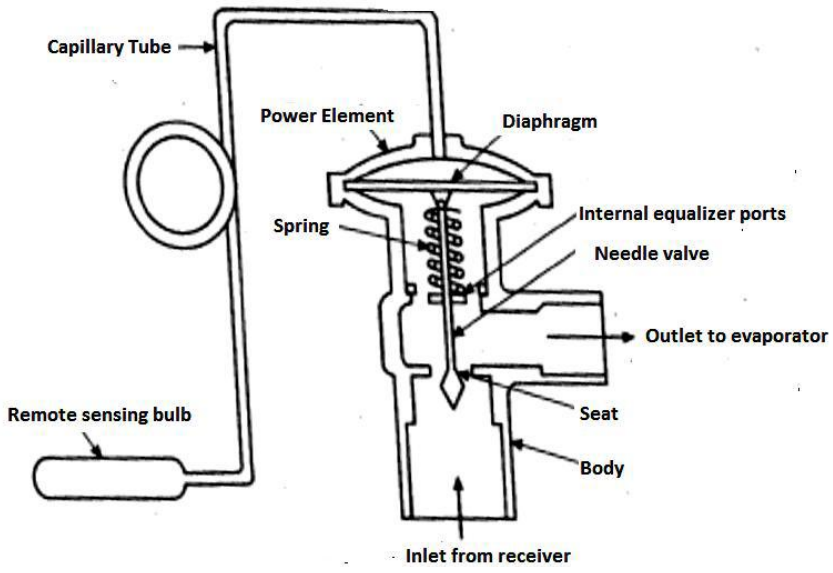
		vapor and these vapors are passing to compressor. For heating the passenger compartment, hot engine coolant is passed through heater core. The air from blower motor fan is passed over the core thus passenger compartment gets warm.	
	b)	**Explain working rack and pinion type steering gear box and state its application**	08
	Ans	**Rack and Pinion type of steering gear box:** The rotary motion of the steering wheel is transmitted to the pinion of the steering gear through the universal joints. The pinion is in mesh with rack. The circular motion of the pinion is transferred to the rack and rack moves linearly and this linear movement of rack is transmitted to the stub axle and wheel gets steered. The rack has ball joints at each end to allow for rise and fall of the wheels. **Application:** Maruti 800, Hindustan Ambassador Mark II  **Fig:- Rack & Pinion Type Steering Gear Box**	03 01 04

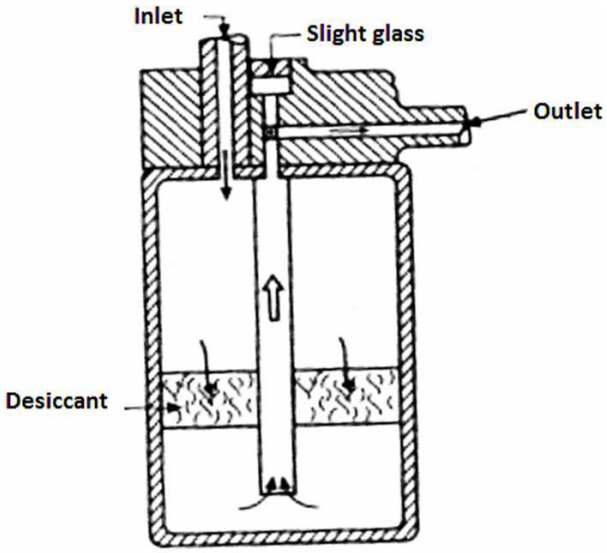
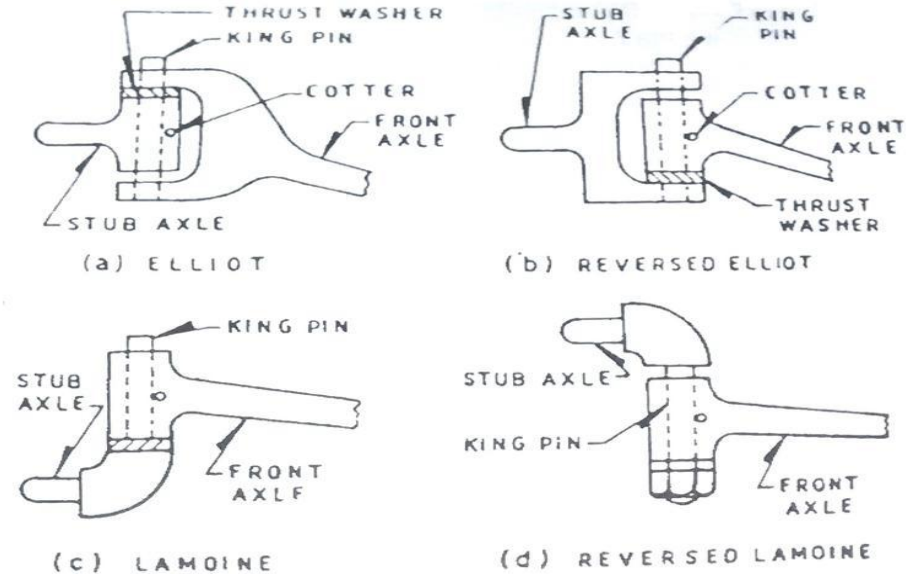
	c)	**Distinguish between independent suspension and rigid axle suspension system**	08
	Ans		(Any 08-01 mark each)

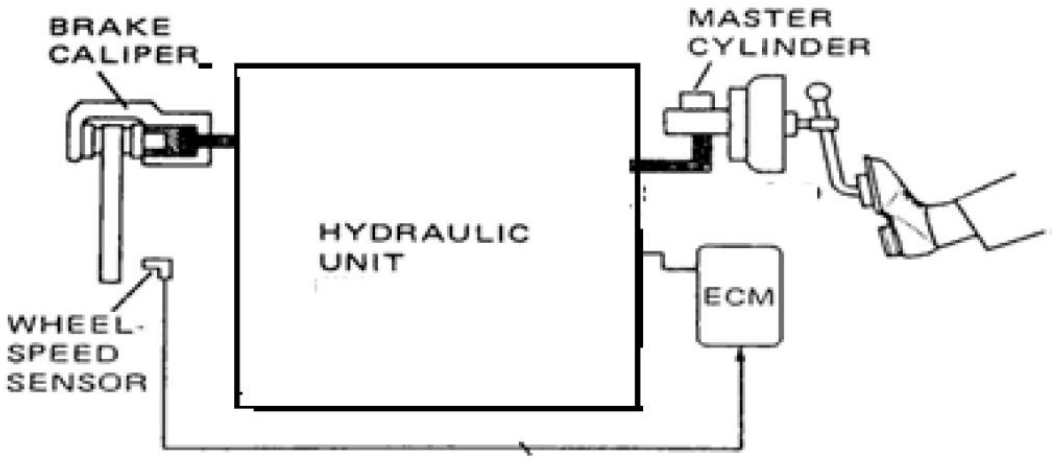
Sr. No.	Independent suspension system	Rigid axle suspension system
01	Lighter springs can be used.	Comparatively heavier springs are used.
02	It reduces un-sprung weight.	Un-sprung weight is more.
03	It increases tyre life.	It reduces tyre life as compared to independent suspension system.
04	Initial cost is high.	Initial cost is low.
05	Greater maintenance is required because of large number of bearings.	Lesser maintenance is required.
06	There is no possibility of tilting of axle.	In this the axle tilts and the wheels no longer remain vertical.
07	In this steering geometry is not altered with spring deflection as in case of rigid axle suspension.	In this steering geometry is altered with spring deflection.
08	More space is available for engine compartment and for passenger.	Less space is available for engine compartment and for passenger.
09	It provides softer suspension, because the low spring rate enables large wheel movement.	It provides harder suspension as compared to independent suspension.

05		**Attempt any four of the following**	16
	a)	**State four advantages of power steering.**	04
	Ans	**Advantages of power steering: (Any 04- 1 mark each)** 1) Power steering reduces the effort needed to turn the steering wheel. 2) Higher degree of steering response is achieved. 3) Hydraulic system also absorbs road shocks, thereby archiving comfort driving. 4) It reduces driver's fatigue. 5) Higher control over the vehicle is possible which leads to greater safety of vehicle.	04
	b)	**State different resistances faced by vehicle and explain any one.**	04
	Ans	**Resistances faced by vehicle:** 1)Air resistance 2)Gradient Resistance 3)Rolling Resistance 1) **Air resistance :-**Resistance to the motion of vehicle when it moves on road due air is called as air resistance Air resistance is directly proportional to square of speed of vehicle. Ra=Ka A V2 Where Ra =Air resistance (N) Ka =Coefficient of air resistance A=Frontal projected area in m2 V= Vehicle speed in Km/Hr Ka= 0.02688 for passenger car Ka=0.023 Streamline car Ka=0.0314 average car Ka=0.045 for trucks & buses 2) **Gradient Resistance:-**Resistance to the motion of vehicle due to different gradient condition of road is called as Gradient resistance.	02

		Note:-it remains constant; component of vehicle gradient is parallel to plane of road & is responsible for gradient resistance. Rg=WG=Mg G Rg=Gradient resistance(N) M=Mass of vehicle in Kg W=Weight of vehicle in (N) G=Gradient expressed as the unit rise divided by distance travelled. 3) **Rolling Resistance:-**Resistance to motion of vehicle due deformation of tyre & road & energy dissipated through the impact this resistance is termed as rolling resistance. Rolling resistance Rr=KrMg Rr=Rolling resistance N M=Mass of vehicle in Kg Kr=Constant of road resistance	(Any one 02 marks)
	c)	**Explain semi-elliptical leaf spring with neat sketch.**	04
	Ans	 It consists of number of leaves called blades. The blades vary in length. The lengthiest blade has eyes on its ends called master leaf. All the leaves are bounded together by means of steel straps. The spring is supported on the axle, front or rear by means of a U – bolt. One end of the spring is mounted on the frame with a simple pin, while on the other end; the connection is made with a shackle. When the vehicle comes across a projection on the road surface, the wheel moves up deflecting the spring. This changes the length between the spring eyes.	02 02
	d)	**Explain desirable properties of braking fluid.**	04
	Ans	**Properties of brake fluid: (Any 04, 01 mark each)** **1) Boiling point:** Boiling point of fluid must be high because due to continue operation of brakes, generates the heat inside the drum, which increases the temperature of fluid in the wheel cylinder and lastly generates the vapour, which decreases the effectiveness of brakes. Therefore the boiling point should be high i.e. 250^0 C to 300^0 C. **2) Viscosity:** Viscosity of brake fluid should be such that the fluid should not lose its fluidity in any atmospheric condition. i.e., too cold or too hot temperature. Therefore, it is necessary that the viscosity of brake fluid should change adequately with the change in temperature to maintain its fluidity. **3) Lubrication properties:** The brake fluid should provide proper lubrication to the pistons in the master cylinder, wheel cylinder. Otherwise these components wear out quickly. **4) Effect on rubber**: A number of rubber seals are used in the hydraulic braking system, therefore the brake fluid should not have any effect on these seals. Otherwise it leads to leakage of fluid, loss of pressure in lines. **5) Corrosive action:** The brake fluid should not corrode the metal components with which it comes into contact. **6) Storage stability:** Brake fluid should have sufficient stability at least 3 years. During this period the fluid should not be spoiled.	04

	e)	**State different types of vehicle bodies with neat sketches**	04
	Ans	**1. Car** 2. **Jeep** 3. **Pick up**4. **Open Truck**5. **Delivery van** 6. **Tanker** 7. **Dumper**8. **Station wagon** 9. **Bus** 10. **Trailer** 	02 (Any two sketches -02 marks)
	f)	**How temperature and humidity is controlled in car air conditioning?**	04
	Ans	 **Figure -Control of temperature** The expansion valve is placed at the evaporator inlet tube. It is used to control refrigerant flow into the evaporator. The expansion valve contains a variable orifice that is controlled by a sensing bulb placed inside the evaporator cooling fins. The sensing bulb is a sealed tube containing a small	01

		amount of refrigerant. The changes in temperature of the evaporator cause the refrigerant inside the sensing bulb to expand or contract. The action of the internal pressure of the sensing bulb controls the amount of refrigerant that flows through the expansion valve by varying the size of the orifice. **Control of humidity:**  Liquid refrigerant enters through the inlet. Any dirt is filtered by the filter pads and moisture is absorbed from the refrigerant by the desiccant. Any refrigerant vapor that does not liquefy in the condenser, is trapped and held until it condenses. Finally, clean and dry liquid refrigerant leaves the receiver dehydrator and goes to expansion valve. Evaporator also helps in dehumidification, as warmer air travels through the aluminum fins of cooler evaporator coil, the moisture content in the air condenses on its surface.	01 01 01
6		**Attempt any TWO of the following**	16
	a)	**Draw neat labeled sketches of different types of stub axle arrangement**	08
	Ans	 	(04 sketches -02 marks each)

	b)	**Explain construction and working of antilock braking system**	08
	Ans	**Construction:** Figure shows block diagram of the antilock braking system. Typically it includes a central electronic control unit (ECU), four wheel speed sensors, and at least two hydraulic valves (hydraulic unit or actuator) and pump. The brake lines from master cylinder connect to hydraulic unit or actuator. Lines from the actuator connect to the wheel brakes. The actuator is controlled by ECU. **Working:** The actuator is controlled by ECU. Wheel speed sensors at each wheel continuously send rotational wheel speed information to the ECU. If it detects a wheel rotating slower than the others, it means there is tendency of wheel lock, it actuates the valves to reduce hydraulic pressure to the brake at the affected wheel, thus reducing the braking force on that wheel; the wheel then turns faster. Conversely, if the ECU detects a wheel rotating faster than the others, brake hydraulic pressure to the wheel is increased so the braking force is reapplied, slowing down the wheel. This process is repeated continuously and can be detected by the driver via brake pedal pulsation. Some anti-lock systems can apply or release braking pressure 15 times per second.  Figure: Antilock brake system. ***(Note: Any other suitable sketch may be considered.)***	02 02 04
	c)	**Explain protective and anti corrosive treatment of vehicle body**	08
	Ans	**Protective treatment of vehicle body** : 1. Surface preparation: **a. Degreasing:** It is a process by which organic deposits such as oil, grease, metallic soaps and inorganic matters like soil, dirt, and shop dust are removed from metal surface. **b. Descaling:** The process of removing scales on the ferrous surface. **c. Derusting:** If the metal is exposed to atmosphere or water, the oxides of iron are formed on the metal surface; these oxides are called as rust. This process of removing the rusting on the surface. 2. **Rinsing:** To remove all acids and acid salts, the work is passed through 2 or 3 successive rinse baths. 3. **Phosphate coating**: Phosphate coating is secondary metallic phosphate of iron, zinc or manganese deposited on steel surfaces. They provide a good anchorage to the paint film and	08

		prevent rust creep underneath the paint film. 4. **Passivation**: After Phosphate coating and rinsing, surfaces are given a final passivation rinse with solution of chromic acid to improve their corrosion resistance. 5**. Sealing**: After passivation and drying, the sealant is to be applied within 2 hours during monsoon and 6 hours during winter and summer months.	