MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2013 Certified)

WINTER– 19EXAMINATION

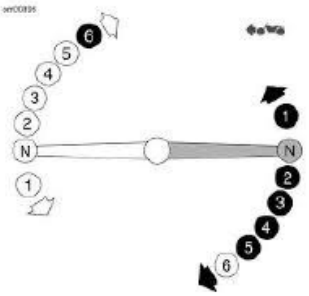
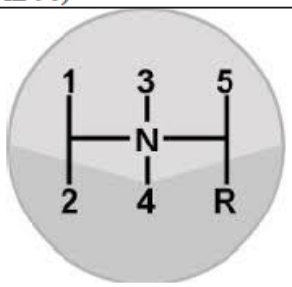
Model Answer

Subject Name: Two Wheeler Technology **Subject Code:** 17521

Important Instructions to examiners:

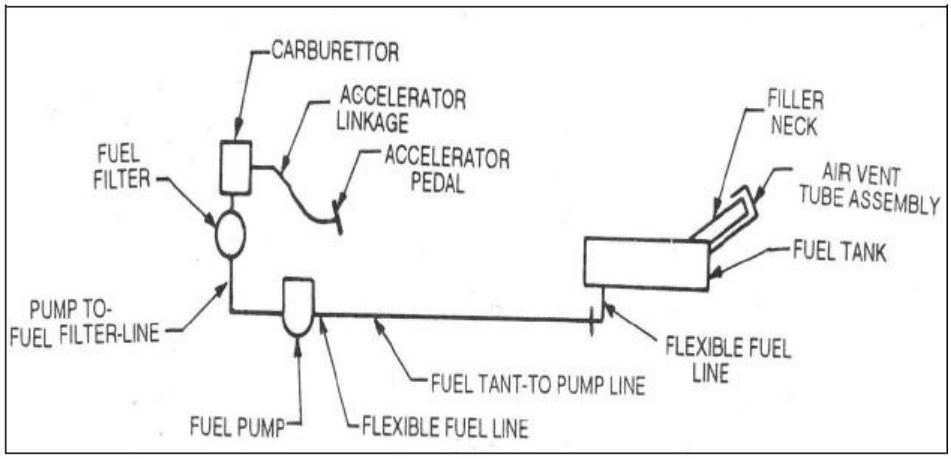
1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling 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.

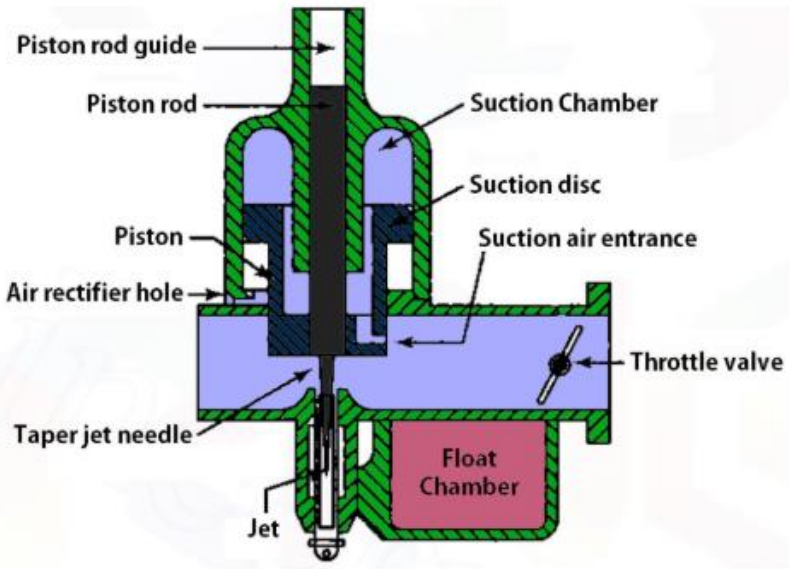
<table>
<tr><th>Q. No</th><th>Sub Q.N.</th><th>Answer</th><th>Marking Scheme</th></tr>
<tr><td>1</td><td>a)</td><td>Attempt any THREE of the following:</td><td>12</td></tr>
<tr><td></td><td>(i)</td><td>Compare two wheeler gear box with four wheeler gear box.</td><td>04</td></tr>
<tr><td></td><td></td><td>Answer: Comparison between two wheeler gear box with four wheeler gear box(Any four Points 4 marks)
<table>
<tr><th>Sr. no.</th><th>Parameter</th><th>Two wheeler gear box</th><th>Four wheeler gear box</th></tr>
<tr><td>1</td><td>Type of gear box</td><td>Only constant mesh gearbox is used. Motorcycle gearboxes are un-synchronized in principle.</td><td>Constant mesh / sliding mesh or synchromesh gearbox may be used.</td></tr>
<tr><td>2.</td><td>Dog system</td><td>Motorcycle dog system is simple, lighter and takes up less space.</td><td>Car dog system is heavier and takes up more space.</td></tr>
<tr><td>3.</td><td>Skill required in changing gear</td><td>More skill is required to change gears.</td><td>Less skill is required to change gears.</td></tr>
<tr><td>4.</td><td>Gear selection</td><td>Motorcycle transmissions are Sequential. i.e. whether up shifting or downshifting, you must select each ratio in order, with neutral available only between first and second gears.</td><td>Driver can access neutral from any gear or speed. Car transmissions are not sequential. But sequential shifting is preferred.</td></tr>
<tr><td>5.</td><td>Size</td><td>Small.</td><td>Large.</td></tr>
<tr><td>6.</td><td>Cost</td><td>Low cost due to absence of synchronizer.</td><td>High cost due to use of synchronizer.</td></tr>
<tr><td>7.</td><td>Weight</td><td>Lighter</td><td>Heavier</td></tr>
</table></td><td>04 (Any four points)</td></tr>
</table>

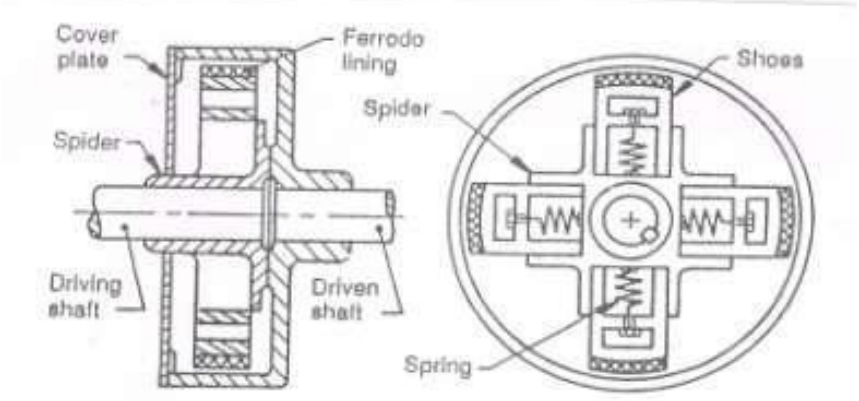
		8.	Maintenance	Less maintenance	More maintenance: Due to complicated dog shift arrangement. Synchronizer cones may need replacement.
		9.	Lubrication	Uses engine oil as lubricant for gearbox. (SAE 30W40)	Uses separate oil as lubricant. (SAE 90)
		10	Symbolic presentation of gear shifting		
	(ii)	**Explain cleaning procedure of paper element of air filter.**			**04**
		Paper Air Filter Element cleaning procedure: Because of the relatively low cost of the paper element, it is generally treated as disposable and replaced when dirty. However, the paper element can be cleaned and reused a number of times. **Water Cleaning:** Rap gently to dislodge accumulated dirt, soak thoroughly approximately 15 minutes in warm water and mild detergent. Rinse thoroughly under low pressure water. Air dry (do not dry with compressed air). **Compressed Air cleaning:** Carefully direct compressed air (100 psi maximum) through dry air filter element, opposite normal direction of flow. After cleaning, inspect carefully for holes or cracks. If damaged, replace element.			**02** **02**
	(iii)	**Differentiate between four stroke and two stroke engine.(any two points)**			**04**
		Answer: Difference between four stroke and two stroke engine.(any two points 04 marks)			**04 (any two points)**

Sr.	Four Stroke Engine	Two Stroke Engine
1	One **working stroke** for **every two revolutions** of the crankshaft.	One **working stroke** for **each revolutions** of the crankshaft.
2	Turning moment on the crankshaft is not even due to one working stroke for every two revolutions of the crankshaft. Hence **heavy flywheel** is required and engine runs unbalanced	Turning moment on the crankshaft is more even due to working stroke for each revolution of the crankshaft, hence **lighter flywheel** is required and engine runs balanced.
3	Engine is heavy.	Engine is light.
4	Thermodynamic cycle is completed in 4 strokes of piston or in two revolutions of crankshaft	Thermodynamic cycle is completed in 2 strokes of piston or in one revolutions of crankshaft

5	Volumetric efficiency is more.	Volumetric efficiency is less.	
6	Thermal efficiency is more.	Thermal efficiency is less.	
7	Engine design is complicated.	Engine design is simple.	
8	Less mechanical efficiency due to more friction on many parts.	More mechanical efficiency due to less friction on few parts.	

	(iv)	**Describe the working of fuel supply system used in two wheeler.**	**04**
		Answer: This system is based upon the simple fact that the engine suction can be based for sucking fuel from the main tank to the auxiliary fuel tank from where it flows by gravity to the carburettor float chamber. In this system the fuel tank is placed below the level of the carburettor. The fuel from the tank is sucked by a separate unit (auto-vac) with the assistance of the inlet manifold vacuum. Then the fuel is fed to the carburettor by gravity. In this system, a steel pipe carries the fuel to the fuel pump which pumps it into the float chamber of the carburetor through a flexible pipe. If the fuel pump is mechanical, it has to be driven from the engine camshaft and hence placed on the engine itself. However electrically operated pump can be placed anywhere. It is mostly located at the rear in the fuel tank reducing the tendency of forming vapour lock. The system provides the fuel requirement at various engine speeds efficiently.	**02** **02**
		 **Fig. Fuel supply System**	
1	**b)**	**Attempt any ONE of the following:**	**06**
	(i)	**Explain construction and working of constant vacuum type carburetor with diagram.**	**06**
		Answer: Constant vacuum type carburetor(S.U. Carburator): **Construction:** S.U Carburetor consists of a sliding piston and the tapered needle inserted into the main jet. Along with the piston upward and downward movement, the needle and the main jet also moves. There is a suction disc attached to the upper end of the piston. Piston rod and the piston rod guide help to guide the piston and the suction disc as shown in the schematic diagram.	

		The piston is loaded with the helical spring. Portion above the suction disc is called the suction chamber which will be connected by the air passage by means of a slot provided in the piston.And there is an ordinary butterfly throttle valve as shown in the fig.There is an air rectifier hole provided at the lower portion of the suction disc and the upper portion of this disc will be connected to the throttle air passage. **Working of constant vacuum type carburetor:** This Carburetor does not have different engine operating condition such as the idling and the slow running(cruising), normal running, accelerating. As the piston is loaded with the helical spring and the weight of the piston will be also supported by the vacuum in the suction chamber. The position of the piston will be balanced by maintaining the constant vacuum in the suction chamber. If any deviation occurred, the piston gets moved up/down. There will be a lever attached to the main jet to control the fuel flow while the engine needs to start. Because the engine starting needs a richer mixture. The throttle is opened more the more air is allowed to pass thru through the inlet due to the upward movement of the piston. the upward movement of the tapered needle also ensures the more fuel flow from the main jet. This is how the air and the fuel passages are varied with the different engine speeds and velocities of the fuel and the air remains constant. in this system.  **Fig. S. U. Carburettor**	**02** **02** **02**
	(ii)	**State the use of** **1) Speedometer** **2) Odometer** **3) Turn Signal Indicator**	**06**
		Answer: **1.** A **speedometer** is a gauge that measures and displays the instantaneous speed of a vehicle. **2.** An **odometer** is an instrument used for measuring the distance traveled by a vehicle. **3. Turn Signal Indicator:** Turn signals—formally called "direction indicators" or	**02** **02**

		"directional signals", and informally known as "directionals", "blinkers", "indicators", or "flashers"—are blinking lamps mounted near the left and right front and rear corners of a vehicle, and sometimes on the sides or on the side mirrors of a vehicle, activated by the driver on one side of the vehicle at a time to advertise intent to turn or change lanes towards that side	**02**
2.		**Attempt any FOUR of the following:**	**16**
	(a)	**Explain working of centrifugal type clutch used in vario-drive mechanism.**	**04**
		Answer: (working 02 marks and Diagram 02 marks) **Working of Centrifugal Clutch:** The centrifugal clutches are usually incorporated into the motor pulleys. It consists of a number of shoes on the inside of a rim of the pulley, as shown in fig. The outer surfaces of the shoes are covered with a friction material. These shoes, which can move radially in guides, are held against the boss (or spider) on the driving shaft by means of springs. The springs exert a radially inward force which is assumed constant. The mass of the shoe, when revolving, causes it to exert a radially outward force (i.e. centrifugal force). The magnitude of this centrifugal force depends upon the speed at which the shoe is revolving. A little consideration will show that when the centrifugal force is less than the spring force, the shoe remain in the same position as when the driving shaft was stationary, but when the centrifugal force is equal to the spring force, the shoe is just floating. When the centrifugal force exceeds the spring force, the shoe moves outward and cones into contact with the driven member and presses against it. The force with which the shoe presses against the driven member is the difference of the centrifugal force and the spring force. The increase of speed causes the shoe to press harder and enables more torque to be transmitted.  Fig. Centrifugal clutch. **OR**	**02** **02**

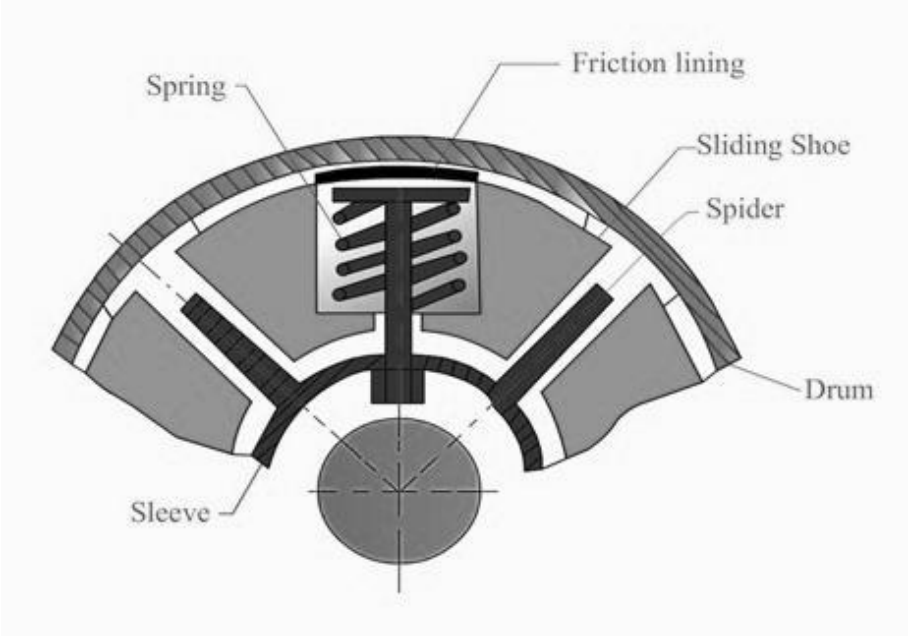
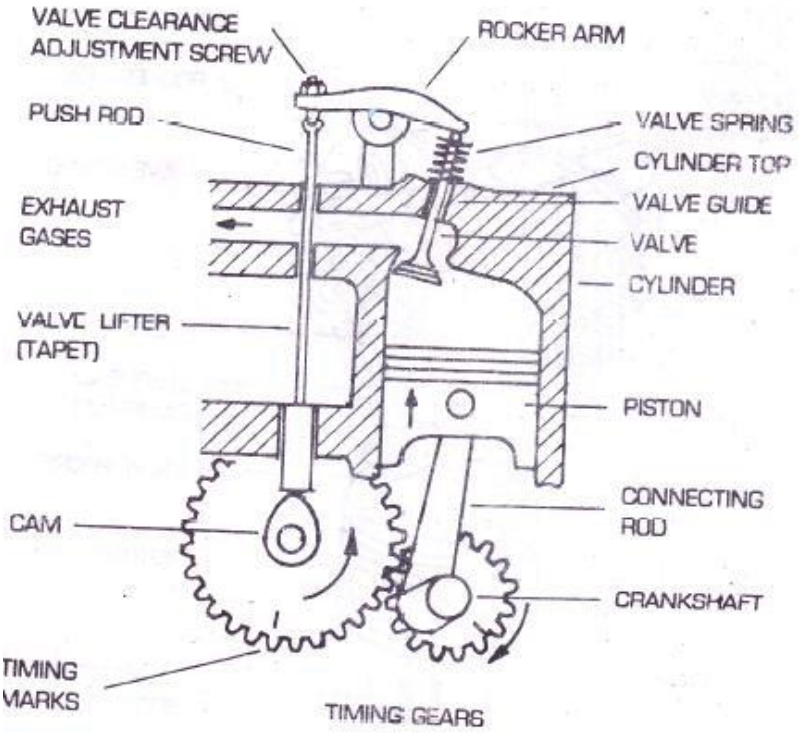
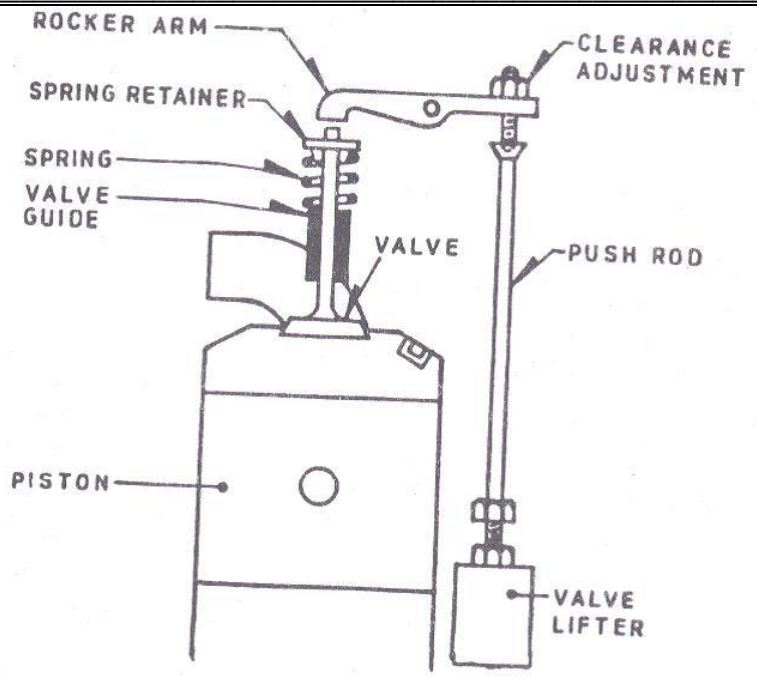


Fig. Centrifugal clutch

	(b)	**Sketch the overhead valve arrangement.**	**04**
		Answer: (neat sketch 02 marks, Labeling 02 marks)  *Overhead valave arrangement* **Or**	**04**

			
	(c)	**Write importance of ground clearance any four points.**	**04**
		Answer: **Importance of ground clearance: Ground clearance is provided for following reasons:** *(any four points)* 1. To overcome potholes and bumps on road with ease and at certain speeds without worrying about any part of vehicle being hit by the road irregularity. 2. To provide adequate cornering clearance during turns. 3. To provide adequate height to the seating position of rider 4. To accommodate for change in position of suspension height and during brake dip. 5. To enable driver to ride vehicle through low lying water logged areas without the trouble of water entering engine systems.	**04 (any four points)**
	(d)	**Explain any four factors which affect the steering.**	**04**
		Answer: The factors that affects the steering most are-*(Any four)* 1. **Steering handle & Fork:** They must provide free movement of the linkage to transmit driver's effort at the handle bar to the front wheel. If there is more play in the steering column steering noise and vibrations are created, most of the steering efforts shall be going waste and if there is less play, hard steering would result in. 2. **Tyre pressure:** It should be as per specifications. Less or uneven pressure of air in the wheels shall result in hard steering and more tyre pressure shall lead to wobbling. 3. **Condition of wheel, wheel bearings and bushes:** hard steering shall result in if there is less play, Run out wheels, wheel alignment shall be affected, which has great influence on the steering operation. 4. **Caster**: caster angle restores the deflected steering to the straight ahead position. It	**04 (Any four points)**

		gives a certain degree of straight line stability. 5. **Steering - Rake and Trail:** Rake and Trail will effect while motorcycle takes a turn. The smaller the Rake Angle, the easier to allow sharp turning and cornering, The greater the Trail, the better stability while travelling straight 6. **Brake adjustments:** If brakes are not properly adjusted, a certain drag on wheel affects the steerability. 7. **Road and operating conditions:** Rough roads, pot holes, rainy season, fog, etc. affect the steering and stability of vehicle. 8. **Overloads :** Excessive load on vehicle will affect the ridding because of difficult steering	
	(e)	**Write any four functions perform by tyre.**	**04**
		Answer: (01 mark each) Important functions of tire are listed below 1. To provide the necessary **Traction to the road surface** so that the vehicle can move. 2. To transmit the **braking force** from braking system of the vehicle to the road. 3. To **carry the load** of the vehicle and provide **shock absorbing** for the **unsprung mass** of the vehicle.(Unsprung mass is the mass of the suspension, wheels , and other components directly connected to them, rather than supported by the suspension) 4. To maintain and change the **direction of travel** of the vehicle.	**04**
3.		**Attempt any FOUR of the following:**	**16**
	(a)	**State any two function of frames with their types.**	**04**
		Answer: Function of frame: (any two - 01 mark each) 1. It acts as a beam supported by the wheels to carry the weight of the propelling machinery and the rider. 2. It provides a non-flexing mount for the engine suspension and wheel. 3. It provides free steering movement of the front wheel. **Types of frame: (02 Marks)** 1) Cradle-single cradle and double cradle frame 2) Backbone frame 3) Tubular frame-single down tube using engine as stressed member 4) Stamped frame	**02** **02**
	(b)	**Write any four advantages of multiple valve.**	**04**
		Answer: Advantages of multiple valve: *(Any four- 1 mark each)* **1.** Increased power output. **2.** Better breathing causes **lower pumping losses** and efficient scavenging. **3.** Better fuel efficiency over a wide range of engine speed. **4.** Light weight engine. Better Power to weight ratio of engine. **5.** Reduced engine emission.	

		6. **Better throttle response** due to lighter weight components of the engine (acceleration and deceleration as well as change in engine performance with respect to throttle position change). 7. **Better pick- up** (acceleration). 8. **Compact design of engine**. i.e. higher power to weight ratio. 9. **Maximum RPM of the engine is increased**. i.e. the engine can be revved at higher rpm and therefore, power output and maximum speed of vehicle is increased. 10. Less frequency of engine decarbonizing and spark plug cleaning. 11. Faster combustion due to central location of the spark plug in combustion chamber. 12. Stable and smooth engine idle operation.	**04**
	(c)	**Explain any four possible causes of suspension troubles.**	**04**
		Answer: **four possible causes of suspension troubles:** • Damaged oil seals in telescopic suspension system. • Damaged springs in suspension system. • Shock absorbers may be defective, which must be replaced. • Incorrect suspension setup.	**04**
	(d)	**Write any four advantages of gas filled shock absorber used in rear end suspension.**	**04**
		Answer Advantages of gas filled shock absorber used at rear end-*(Any four points- 1Mark each)* 1. The full diameter of the tube can be used as a working chamber and thereby a larger volume of oil becomes available for damping. 2. The larger volume of oil made available in any one stroke because of the adjustments between gas and oil volumes provides a better facility for the damping force. 3. The tolerance to heat in gas filled shock absorber is greater. 4. Gas filled shock absorber give longer life to tyres and other related components in the suspension such as springs, brushes etc. 5. A gas filled shock absorber is designed to reduce foaming of the oil. 6. Provide stability while graduating turns.	**04**
	(e)	**Differentiate between motorcycle wheel and scooter wheel.**	**04**

Answer: **Difference between wheels of motor cycle and scooter:**

Sr. No	Parameter	Motor cycle Wheel	Scooter Wheel
1	Size	Mostly prefer size for front-2.75 x 17 for rear -3.00 x 17 Ground clearance-170 mm	Mostly prefer size 3.50-10 Ground clearance-135 mm
2	Construction	Solid wheel and spoke wheel are used, Made from cast aluminum and some wheels are carved from a block of solid aluminum Using computer controlled carving.	Wheel consists of steel rim and pressed steel disc. The rim is rolled section. Sometimes riveted but usually welded to the flange of the disc
3	Tyre rotation	Motorcycle don't need rotations, in fact front and rear tire size are different hence it can't be rotated.	Scooter tires need to be rotated every 3000km. scooters are equipped with additional Stephaney and the front and rear tire size are same so it need to be rotated.
4	Off road driving suitability	Motorcycle is suitable and reliable than scooter on off road condition. On small bumps and ditches motorcycle tires could not caught or trapped.	Scooters are less reliable than motorcycle because of tire size are small. These are caught or trapped on small bumps and small ditches

04

4. (a) Attempt any Three of the following **12**

(i) Differentiate between Disc and Drum brakes (any four points). **04**

Answer: Comparison of drum brake with disc brake: *(Any four points -1 mark each)*

Sr. No.	Drum brake	Disc brake
1.	Friction occurs on the internal surfaces therefore heat dissipated only by conduction through the drum	Frication surfaces are directly exposed to the cooling air.
2.	Curved frication pads are used	Flat frication pads are used
3.	Non uniform wear of frication linings.	There uniform wear of friction pads
4.	There is loss of efficiency due to expansion	There is no loss of efficiency due to expansion
5.	Comparatively higher weight	Weight is less so saving up to 20 % is possible
6.	Comparatively higher anti-fade characteristics	Disk brakes have comparatively better anti fade characteristics.
7.	Complicated design	Simple in design
8.	Removal and replacement of brake linings is difficult and consumes more time.	Comparatively easy to remove and replace friction pads
9	More friction area	Less friction area
10	Pressure intensity is less	Pressure intensity is more

04

(ii) Describe working of CDI system. **04**

Answer: (Description – 02 marks and neat sketch -02 marks)

Working of CDI system: It mainly consists of 6-12 V battery, ignition switch, DC to DC convertor, charging resistance, tank capacitor, Silicon Controlled Rectifier (SCR), SCR-triggering device; step up transformer, spark plugs. A 6-12 volt battery is connected to DC to DC converter i.e. power circuit through the ignition switch, which is designed to give or increase the voltage to 250-350 volts. This high voltage is used to charge the tank capacitor (or condenser) to this voltage through the charging resistance. The charging resistance is also so designed that it controls the required current in the SCR. Depending upon the engine firing order, whenever the SCR triggering device, sends a pulse, then the current flowing through the primary winding is stopped. And the magnetic field begins to collapse. This collapsing magnetic field will induce or step up high voltage current in the secondary, which while jumping the spark plug gap produces the spark, and the charge of air fuel mixture is ignited. **02**

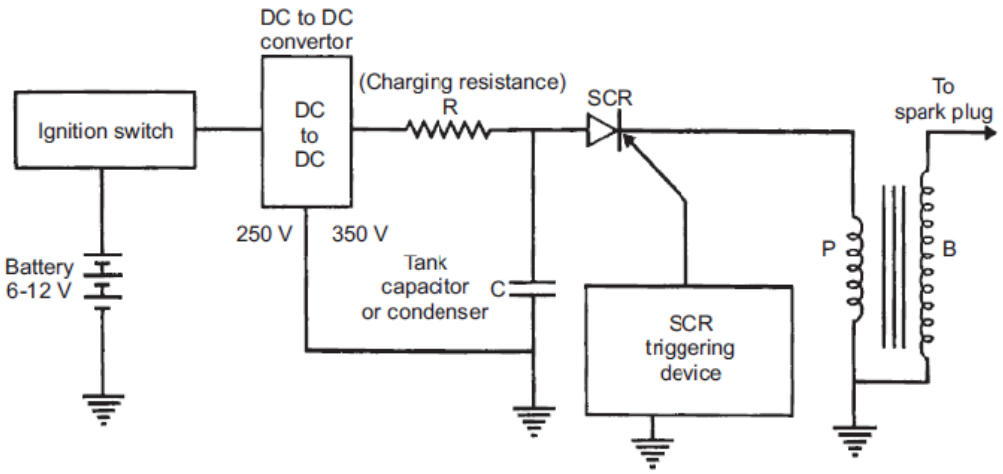


Fig. Capacitance Discharge Ignition System **02**

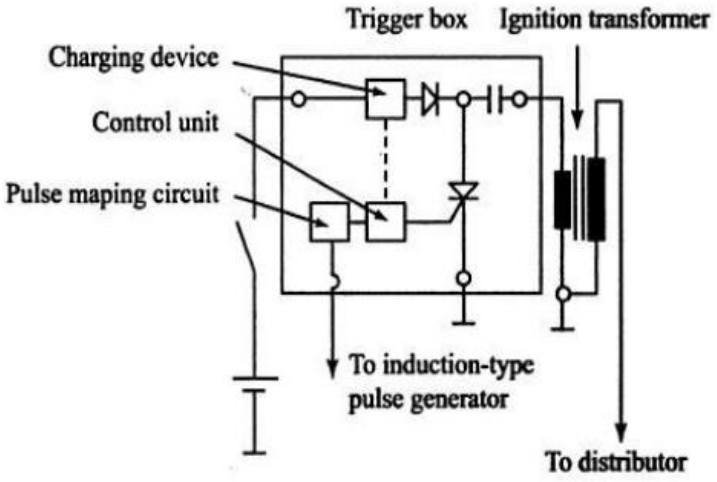
OR

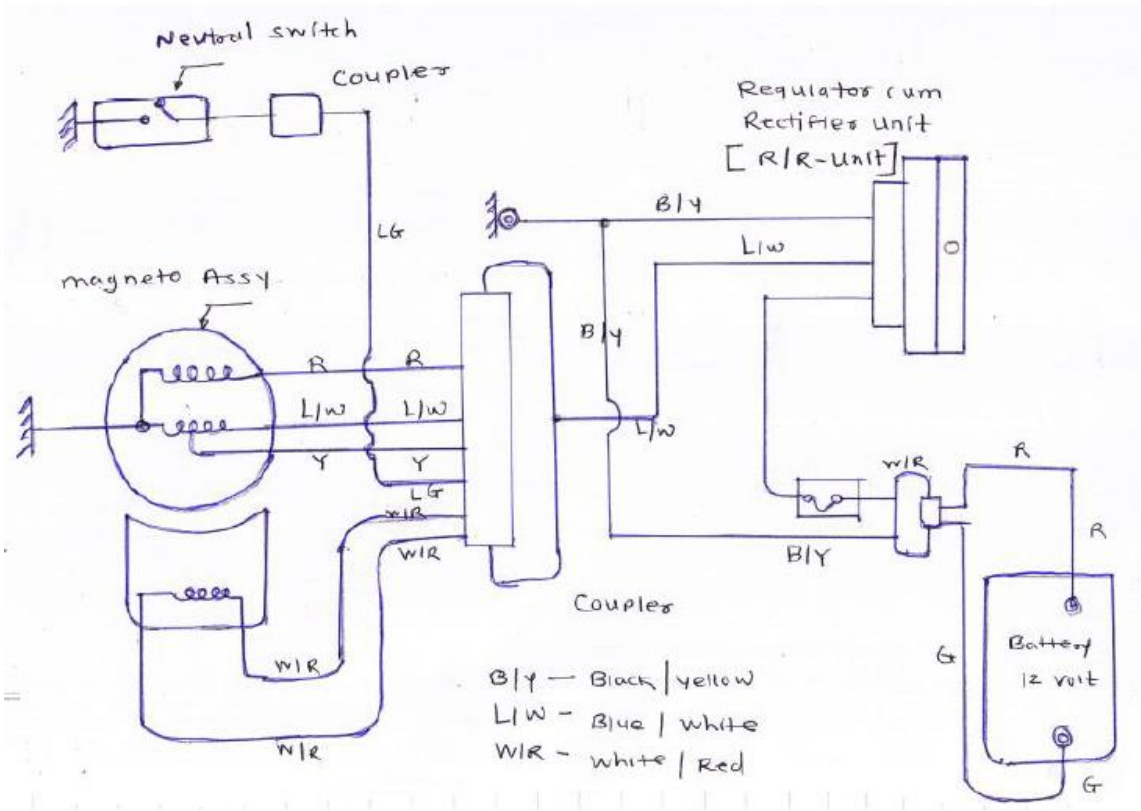
Construction and working of CDI System:

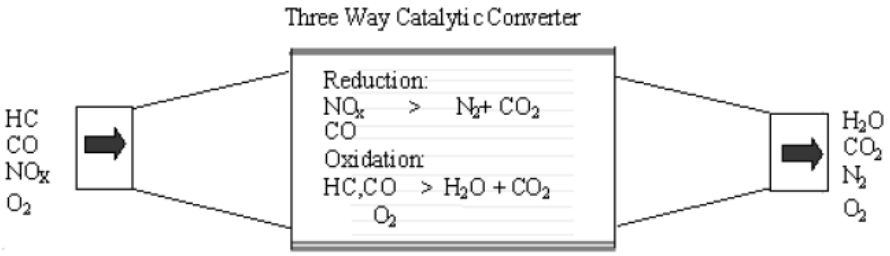
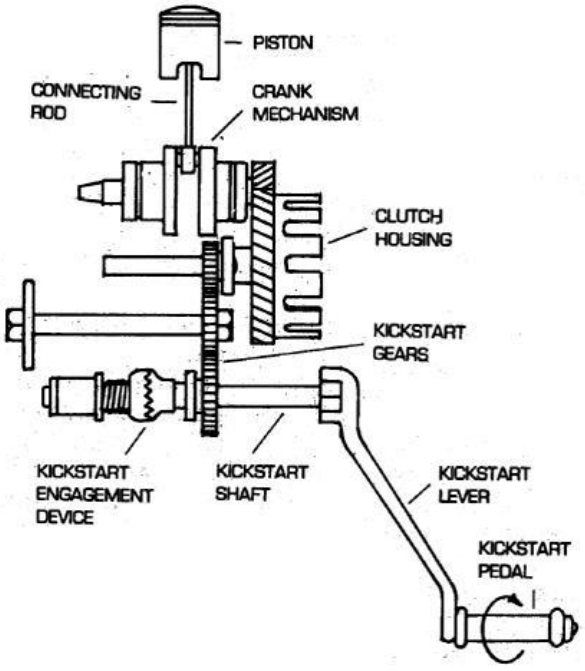
CDI system consists of primary circuit and secondary circuit **The primary circuit consists of following components:** i) Primary winding of pulse transformer ii) Condenser iii) Resistance iv) SCR v) Pulse generator. vi) Battery vii) DC to AC convertor/charging device

The secondary circuit consists of following components: i) Secondary winding of pulse transformer ii) Spark plug iii) Spark plug HT coil

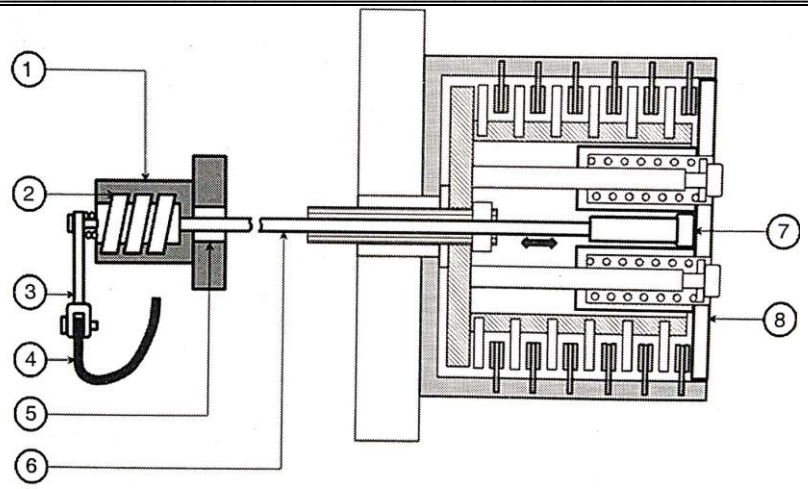
Working: • CDI system uses charge of capacitor for generating spark- using pulse transformer • Thyrister/ silicon controlled rectifier is used as switch- for primary circuit current through capacitor. • It also uses a pulse generator to trigger SCR through Gate circuit. • Pulse transformer has low inductance, so the change in flux across primary and secondary windings is very rapid. • This provides high voltage spark (about 30,000V) during the entire speed range of the engine. • The electronic circuitry uses conversion of AC to DC charging device, signal conditioning and amplifying unit and control circuit.

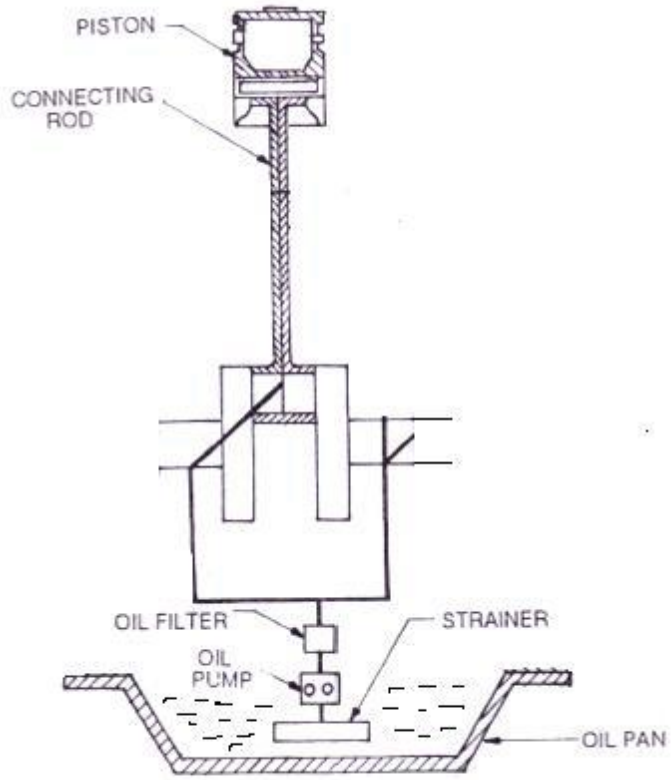
		 *Fig. Schematic of Capacitive Discharge Ignition (CDI) System*	
	(iii)	**State the use of** **(1) Tachometer at dashboard.** **(2) Tail and Dumper plate lamp**	**04**
		1. Tachometer at dashboard:– The tachometer is use to display the speed of the engine in revolutions per minute or RPMs. **2.** . **Tail and Number plate lamp:** Conspicuity for the rear of a vehicle is provided by rear position lamps (also called tail lamps or tail lights). These are required to produce only red light and to be wired such that they are lit whenever the front position lamps are lit, including when the headlamps are on. Rear position lamps may be combined with the vehicle's stop lamps or separate from them. In combined-function installations, the lamps produce brighter red light for the stop lamp function and dimmer red light for the rear position lamp function. Regulations worldwide stipulate minimum intensity ratios between the bright (stop) and dim (rear position) modes, so that a vehicle displaying rear position lamps will not be mistakenly interpreted as showing stop lamps, and vice versa. **Number plate lamp** is used to illuminate Registration Number of vehicle.	**02** **01** **01**
	(iv)	**Draw the circuit diagram of charging system.**	**04**
		Answer: **Circuit diagram of two wheeler charging system:** *(Neat appropriate diagram with correct labelling)*	

		 Figure: Circuit diagram of two wheeler charging system showing AC and DC circuits	04
4.	**(b)**	**Attempt any ONE of the following:**	**06**
	(i)	**Explain construction and working of three way catalytic converter with block diagram.**	**06**
		Answer- *(Sketch-02 construction-02 working-02)* **Three Way Catalytic Converter:** **Construction**: It is a device with porous ceramic structure fitted in the engine exhaust system which converts various emissions into less harmful ones using generally a combination of platinum, palladium & rhodium as catalysts. **Working:** The catalytic converters conversion rate is largely a function of operating temperature; no meaningful treatment of pollutants takes place until the converter has reached an operating temperature of approximately 400…8000C provide ideal conditions for maximum efficiency and extended service life. **Catalyst Reduction** First, nitrogen oxide gives up its oxygen. This only occurs when a sufficient amount of carbon monoxide is available for the oxygen to bond with. This chemical reaction results in reduction of nitrogen oxide to pure nitrogen and oxidation of carbon monoxide to form carbon dioxide. **Catalyst Oxidation.** Second, hydrocarbon and carbon monoxide continue to burn. This occurs only if there is a sufficient amount of oxygen available for the hydrogen and carbon to bond with. This chemical reaction results in oxidation of hydrogen and carbon to form water vapour	**02** **02**

		(H2O) and carbon dioxide (CO2).  	**02**
	(ii)	**Explain working of kick start mechanism. State each two merits and demerits of its.**	**06**
		Answer: **Kick start arrangement:** The arrangement of kick start mechanism is shown in the figure. When the kick is applied to start a motorcycle, kick start engagement device actuates the ratchet gear and torsion spring. Ratchet gear transmits power and motion through kick shaft gear to clutch housing with the help of idler or intermediate gear. At the same time, torsion spring stores some energy and uses this energy to return the kick to its initial position. Secondary gear which is mounted on the clutch housing transfer this motion and power to the ring gear which is mounted on the engine crankshaft with the help of clutch housing.	**02**
		 	**02**
		Merits of Kick start mechanism : (any two -01mark) 1. It is reliable and useful in all climatic conditions. 2. It is cheaper or less expensive.	**01**

		3. It is maintenance free due to absence of battery, starter motor and electrical switches. **De-Merits of Kick start mechanism : (any two – 01 mark)** 1. Kick start mechanism is tiresome operation-requires physical or manual force to start the engine 2. In case of high compression vehicle, back kick problem arises so it could damage the leg. 3. It is difficult to start the vehicle in cold conditions	**01**
5.		**Attempt any FOUR of the following:**	**16**
	a)	**Explain cable actuated clutch working with diagram.**	**04**
		Answer: Cable actuated Multiplate clutch : Multiplate clutch always remains in engaged position due to spring force. The spring force must be released to disengage the clutch, i.e. the plate must be separated to disengage the transmission from the engine. A release mechanism is used to achieve this engagement. The release mechanism pushes the pressure plate away from the clutch boss. The clutch springs are compressed and axial force is removed for the moment. The friction plates and clutch plates become free to rotate and slip with respect to each other. As shown in figure a lever is connected to the inner release component which is directly pulled by the clutch cable. A pushrod -1 is extended from inner release to the other side in the clutch boss. The pushrod -1 can freely reciprocate inside the output shaft of the clutch. At the end of pushrod-1, another small pushrod -2 is used to push the pressure plate away from the clutch boss. A retaining spring used between inner release to hold the position of lever. The screw type motion of inner release is transmitted to the pushrods. The pull of the clutch cable is then converted into the direct pushing motion needed to disengage the clutch. The compressed clutch springs again force the pressure plate to engage the clutch as soon as the driver release the hand lever.	**02** **02**

		 1. Release outer 2. Release inner 3. Lever 4. Clutch cable 5. Bush 6. Pushrod–1 7. Pushrod–2 8. Pressure plate **Figure** Screw-type Clutch Release Mechanism.	
	b)	**Explain working of wet sump pressured lubrication system in two wheeler.**	**04**
		Answer: (description-02 marks and sketch -02 marks) **Working of wet sump pressurized lubrication for two stroke engine :** The system in which lubricating oil is stored in the oil sump is called wet sump system, like pressure lubricating system. In this system, the engine parts are lubricated under pressure feed. The lubricating oils is stored in a separate tank or the sump from where an oil pump takes the oil through a strainer and delivers it through a filter to the main oil gallery at a pressure to 2-4 kg/cm2. Oil filters and strainers in the systems clear off the oil from dust metal particles and other harmful particles. The oil from the main gallery goes to main bearings from where some of it after lubricating the main bearing falls back to the sump, some is splashed to lubricate the cylinder walls and the remaining goes through a hole to the crankpin. From the crank pin it goes the piston pin through a hole in the connecting rod web where it lubricates the piston rings.	**02** **02**

		 Wet sump presurrised lubrication system	
	c)	**Write any two advantages of twin spark ignition system.**	**04**
		Answer: **Advantages of twin spark ignition system** - *(Any two)* 1. The microprocessor memory chip manages accurate ignition timing at all level of engine load and speed with respect to engine rpm. This optimizes power and lead to better derivability. 2. The twin spark plugs introduce spark simultaneously in the combustion chamber and improvises combustion process, which leads to low emissions, better fuel efficiency and minimizes knocking drastically. 3. This system can adjust idling speed & even cuts off fuel feed when acceleration grip is released and meters the enrichment of the air – fuel mixture for cold starting and accelerating purposes. 4. Less vibration and noise 5. Long life of the engine parts such as piston ring and valve stem 6. Decreases in the specific fuel consumption 7. No overheating. 8. Increase the thermal efficiency of engine and even bear high load on it.	**04 (Any Two points)**
	d)	**Write any two precautions to avoid skidding of two wheeler.**	**04**

		Answer: (any two precautions 04 marks) While skidding is not inevitable, here are some precautions to prevent skidding: 1. Tyre Check: Bald or worn-out tyres are more susceptible to hydroplaning. Ensure they have sufficient tread depth. Also, keep tyres inflated with the correct air pressure. 2. Go Slow: When the roads are wet, drive slowly and carefully, especially on curves. The faster you go, the more difficult it gets for tyres to expel water from under them. 3. Water Alert: Avoid driving through puddles and waterlogged roads and stay in the middle lane as water tends to pool in the outer lanes.	**04**
	e)	**Describe ergonomic aspects for seat arrangement for rider and pillion rider.**	**04**
		Answer: **Seating arrangement for rider and pillion rider:** The design of the motorcycle is limited by the physical constraints of making the machine work. Comfort and ease of use, and ultimately your safety, will be determined by the type of bike you choose and this should depend on how you plan to use it. The seat and footrests are the right height for you. The fit of the bike to the user can be critical in long term comfort. Riders, of course, are different shapes and sizes so a bike that works well for one person may not work for someone else. It is more convince to both rider & pillion rider to seat for long trip or tour. The tapper portion of raised seat supports the seating arrangement for rider. The taper portion of seat supports the back bone of rider. For pillion riders the design of seat at rear end is important. At the time of braking due to inertia effect the pillion rider should moves on front side pushing the rider at downward direction not in forward direction. It improves the comfort driving as well as seating. Now a day Instead of using separate seat for rider & pillion rider, combined seat is used for better comfort. It provides large space as compared to earlier (old) designed seat. The front side of seat should have narrow section which gives comfort zone to rider while driving. Seat should have good cushioning (use of helical tension spring & leather) to protect both rider & pillion rider from shocks & vibrations on road.	**04**
6.		**Attempt any FOUR of the following:**	**16**
	a)	**Draw block diagram of micro processer controlled ignition system.**	**04**
		Answer: (Neat sketch -02 marks, Labelling -02 marks)	

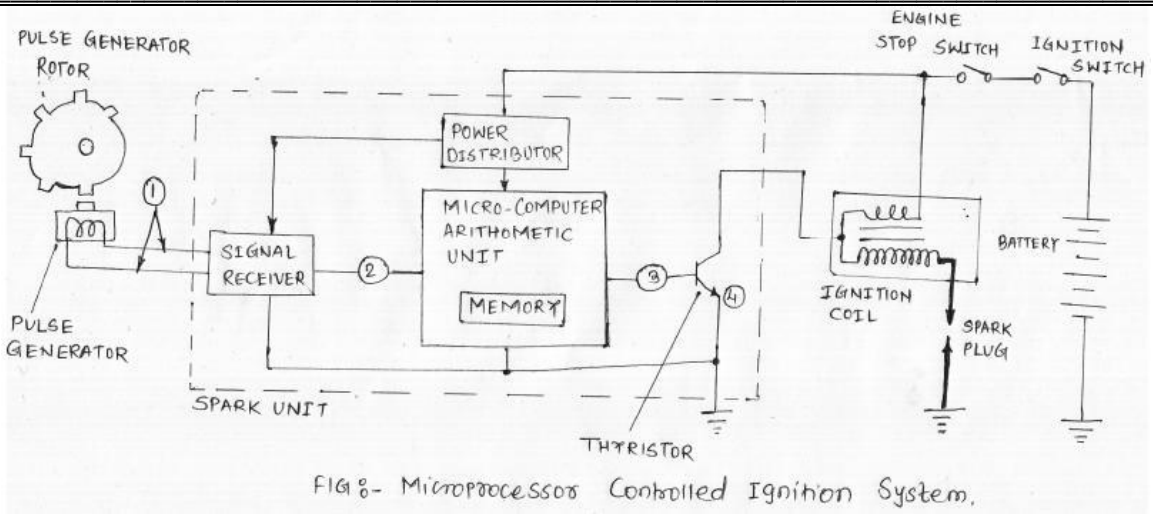
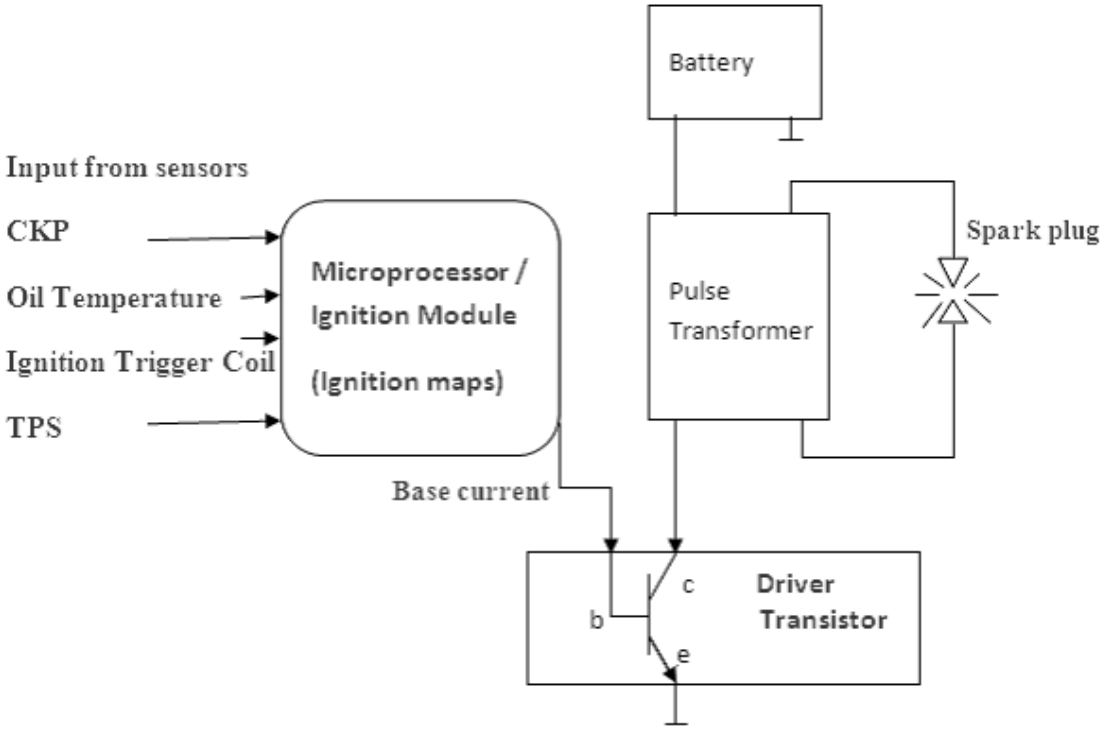


FIG :- Microprocessor Controlled Ignition System.

04

OR

Microprocessor controlled ignition system:



	b)	**Draw layout of exhaust system in two wheeler and write function of each part.**	

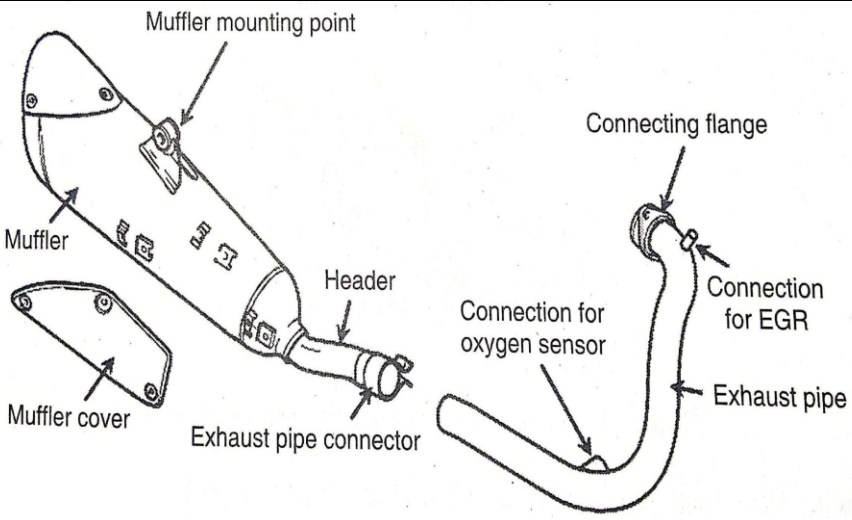
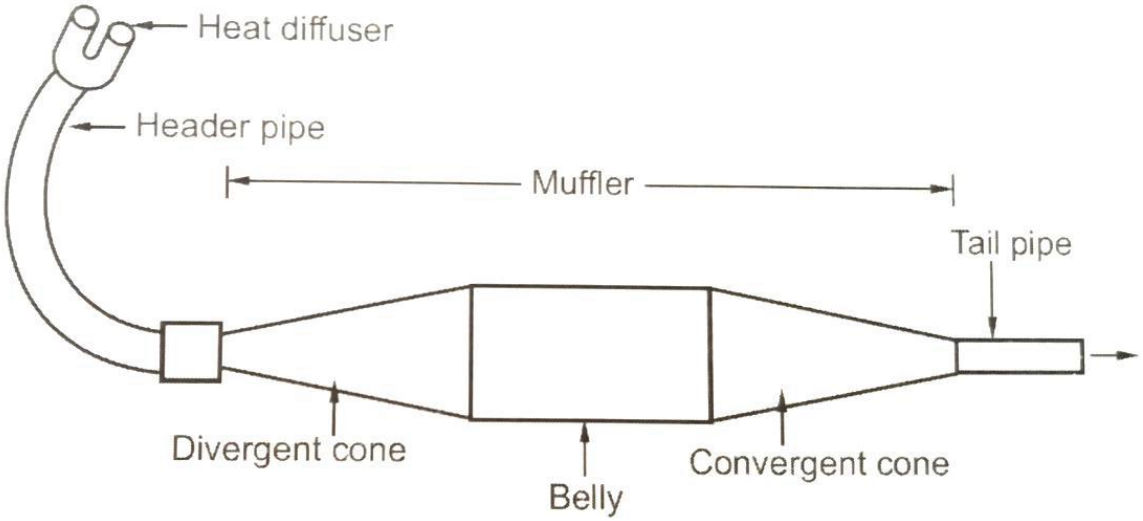


Figure Layout of Exhaust System.

OR



Exhaust Pipe and Header: It is also known as runner pipe. It is used to remove the exhaust gases with highest possible velocity. It is also used to maintain the back pressure.

Muffler: The function of a Muffler or a Silencer in Vehicle is to cool the exhaust gases by expansion through it and to reduce the noise of outgoing gases. The exhaust gases must be discharged into the atmosphere with minimum restriction. The restriction in flow of exhaust gases causes back pressure.

Tail Pipe:

Tail pipe is final length of exhaust pipe which ends with just a straight or angled cut where it vents open to air. Some tail pipes also have a small resonator inside for additional noise reduction.

	c)	**Write any four battery care tips.**	**04**

		Answer: 1. **Drive Regularly –** Batteries are known for storing electric charge that results from reaction between chemicals present in them. These chemicals react only when the vehicle is in motion. So, make sure you are driving regularly to maintain the level of charge in it. 2. **Regular Engine Servicing –** Efficiency and stability of engines bear direct relationship with battery's life. So, to prolong your best vehicle battery's life keep a check on its engine's health regularly. 3. **Checking Charging Rates –** Another major battery care tip - get your battery's charging rate checked at your nearby service station regularly. And never forget, both over & under charging reduce battery's life and violate its warranty. 4. **Keep Away From Draining It –** Try not to leave your vehicle accessories and equipment on as you get out of it. All these actions drain charge from batteries and demand frequent recharging. Higher the rate of recharging lower will be its life expectancy. 5. **Significance Of A Clean Battery Case –** One of the most important care tips, moisture and dirt are biggest foes of battery life. Keep your battery's case and terminals free from dirt and dampness as these may lead to breakdown and lessen its life. 6. **Never Avoid Early Warning Signs –** Keep a check on such signs; cranking sounds and short circuits are some of the early signs that indicate need for battery maintenance measures. **7. Topping Up Water Level In It –** Even the best batteries with 'Low Maintenance' & 'Standard' signs need a specific level of water to function normally. **E**nsure that it is always filled with distill water up to the plates.	**04 (Any four points)**
	d)	**Describe effect of shape of head lamps on aerodynamic of motorcycles.**	**04**
		Answer: **Effect of Shape of headlamp on aerodynamics of motorcycle :** The headlamp is available in different shapes; it is depending on the type of manufacturer or type of vehicle. For example 1. In motorcycle it is separately placed at the centre of handle bar. 2. In case of scooters the head lamp is inbuilt in the handle bar arrangement. The head lamp is open to atmosphere. The front upcoming air strikes directly on it. So that the head lamp body must be robust and it should be suitably installed. If any sharp edge is on the outer body of the head lamp creates air resistance which affects the efficiency of vehicle. So that the shape must be streamline with no sharp edges. The rounded portion of outer body minimized the air resistance. In this way the head lamp must be streamlined aerodynamically shaped and easy to install. The angle of various beams must be suitably adjusted so that the visibility is cleared.	**04**
	e)	**Explain any four good riding habits.**	**04**
		Answer: Following are the **good driving habits to avoid accidents**: *(Any 4 points)* i) To avoid low visibility the driver should wear clearly visible clothing.	

		ii) At night driving the driver should not wear day night goggle. iii) Use safety devices for e.g. Helmet, jacket, shoes, hand gloves etc. iv) Use various indicators, horns; high and low beam lamps while driving. v) When applying the brakes, use both front and rear brakes. vi) The driver should maintain steady speed avoiding quick acceleration and sudden braking. vii) Always obey lane discipline viii) Drive vehicle in economy mode.	**04 (any four points)**