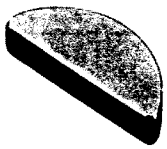
4.19 POWER MECHANICS (447)

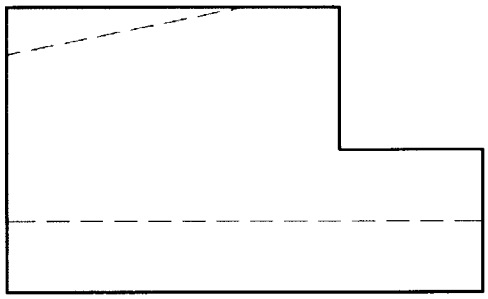
4.19.1 Power Mechanics Paper 1 (447/1)

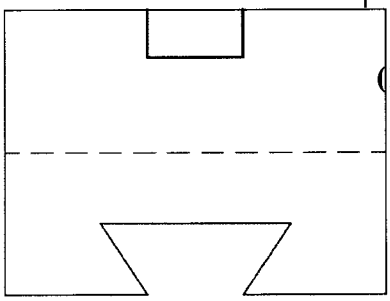
SECTION A

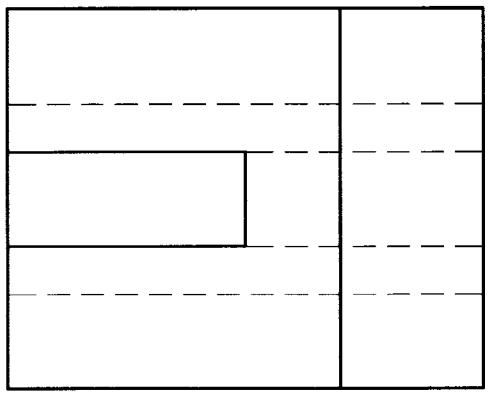
1. (a)	- Ensure parking brakes are applied. - Ensure lift jack is at the correct position on the car frame. - Secure the other wheels/block the other wheels. - Use axle stand in case the jack fails. Any two = (2 marks)	**(3 marks)**
(b)	- Being honest - Being punctual - Morally up right - Champion for rights Any 2 x ½=(1 mark) Accept other correct statements.	
2. (a)	- Motor vehicle mechanic - Motor vehicle electrician - Spray painter and panel beating - Driving - Welding and fabrication Any 3 x 1 = 3 marks)	**(5 marks)**
(b)	 - Correct drawing = 1 mark - Proportionality = 1 mark - 2 marks	
3. (a)	(i) - Keep metal clean during heating - Breakdown surface tension of the solder enabling it to flow. - Preventing re-oxidation - Removing oxides 2 x 1 = (2 marks) (ii) To reduce cylinder pressure to low, safe and steady working levels. (1 mark)	**(5 marks)**
(b)	A – measuring external diameter B - measuring depth 2 x1 = (2 marks)	

4. (a)	(i) Forming – making of different shapes from a standard material. (1 mark) (ii) Finishing – A process of making a work surface attractive, safe to handle and protected from chemical and physical attacks. (1 mark)	**(4 marks)**
(b)	 woodruff key (1 mark)  tab (1 mark)	
5. (a)	- Remove exhaust/burnt gases from the engine cylinder. - Assist in reducing excess temperatures on the engine. - Reduce speed of exhaust gases and thus reduce the engine noise. - Reduces poisonous byproduct gases. Any 2 x 1 = (2 marks)	**(4 marks)**
(b)	- Directly into the cylinder head from the face of the seat when the valve is closed. - Along the stem and through the guide into the cylinder head. 2 x 1 = (2 marks)	
6. (a)	- Ensures that road wheels remain in contact with the road surface. - Ensures that the front and rear axles are correctly located. - Should support the sprung and sprung weight of the vehicle. - Reduce shocks Any 2 x 1 (2 marks)	**(4 marks)**
(b)	(i) Retardar – limits the speed of the vehicle when descending downhill. (1 mark) (ii) Adjuster - compensate for brake lining wear by adjusting shoes to be near the drum (1 mark)	

7. (a)	(i) Light to electrical (1 mark) (ii) Electrical to sound (1 mark)	
(b)	(i) – Series – wound - Parallel wound 2 x ½ = (1mark) (ii) A horn relay overcomes the problem of excessive voltage drop in the horn circuit and make the push button durable. (1 mark)	**(4 marks)**
8. (a)	A - Blower B - Air chest/chamber C - Injector D - Inlet ports 4 x ½ = (2 marks)	
(b)	- Hotchkiss type: (open type) propeller shaft is exposed – one can see the rotating shaft. - Torque tube type: (is enclosed) You cannot see the rotating part. (2 marks)	**(4 marks)**
9. (a)	(i) Shoulder wear – under inflation. (1 mark)	
(b)	- Loose, worn or damaged steering linkages - Loose steering box mountings - Wrong steering box adjustment - Worn suspension ball joints or king pin - Loose wheel bearings Any 2 x 1 = (2 marks)	**(3 marks)**
10. (a)	- It acts as a back-up system in case of failure. - It acts as a safety mechanism when the vehicle is either parking or climbing a hill or descending downhill. Any 2 x 1= (2 marks)	
(b)	(i) It is the engine size in cubic capacity (calculated as total volume x number of cylinders) (1 mark) (ii) It is the rate at which the engine does the work. (1 mark)	**(4 marks)**







(15 marks)

8 faces..... 8 x 1 = (8 marks)
1 veer surface ... 1 x 1 = (1 marks)
Point P..... 2 x 1 = (2 mark)
1 enclave 1x1 = (1 mark)
Neatness 1x1 = (1 mark)
Correct use of grid paper ..... (2 marks)
Total (15 marks)

12 (a)

(i) Electrolytic: - It is the solution that facilitates chemical reaction within the battery. It is usually comprised of concentrated sulphuric acid and distilled water.
(1 mark)

(ii) Cathode – It is the negative terminal or plate of the battery.
(1 mark)

(iii) Specific gravity: Refers to the measure of state of charge of a battery.
(1 mark)

(b)

- Electrolyte level check
- Checking of terminals and cleaning them and covering them with Vaseline.
- Tightness of terminals
- Securing the battery tightly on the vehicle
- State of charge
- Unblocking cap vents
- Checking of bubbling cells.

Any 2 x 1 =(2 marks)

(c)

- When the ignition key is turned to the ON position, the switch completes the ignition instrument and accessories circuit. (1 mark)
- When the switch is further turned to the ON-START position, both run and starting circuits are connected. (1 mark)
- The switch is spring loaded at the start position so that the key snaps back to the ON position to stop current drain from the battery immediately the operator releases the key. (2 marks)
- A multi-purpose switch is to provide vehicle security in addition to the normal operation. (1 mark)

13 (a)

PART	NAME	FUNCTION
A	Fuel lines	- High pressure pipe that delivers fuel from injector pump to the injector.
B	Injector pump	- It meters the quantities of fuel to the injector.
C	Fuel filter	- To remove any foreign particles and water from the diesel fuel.
D	Injector	- Atomises the fuel - Directs the atomized fuel to the combustion chamber
E	Fuel feed pump/life pump	- Move fuel from the tank through the filters to the high-pressure fuel injection pump.
F	Fuel tank	- Storage of fuel
	6x ½ = 3	6 x 1 = (6 marks) Total (9 marks)

(b)

- When the fuel is fully depleted (empty tank)
- Broken pipes
- Loose connections
- After servicing

Any 2 x 1 = (2 marks)

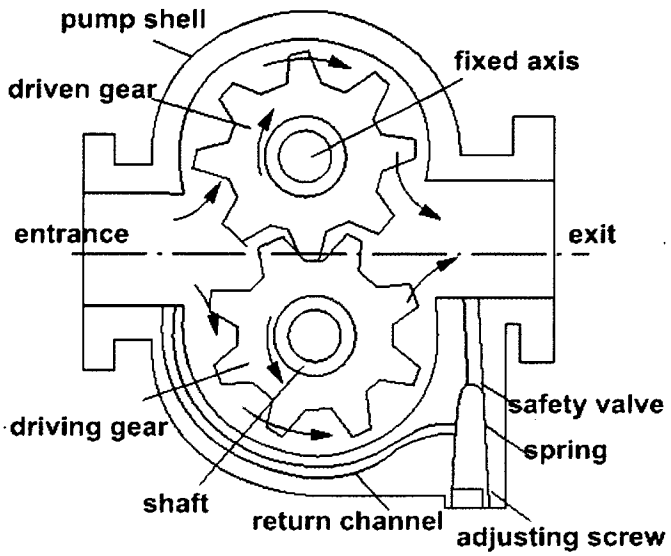
(c)

(i) Types of governors
- Mechanical
- Pneumatic

2 x ½ = (1 mark)

(ii) – Ensures the engine does not exceed its shaft maximum rpm setting
- Control engine speed within defined limits
- Ensure that the correct amount of fuel is injected into the combustion chamber under all engine speed and load conditions.

Any 2 x 1 = (2 marks)

14 (a)	(i) - Prevent pollution of environment by venting crankcase vapours. - Prevent formation of sludge in the crankcase. - Prevent excessive pressure in the crankcase. Any 2x1 = (2 marks) (ii) – Exhaust gases - Leaked unburnt fuel - Carbon and solid metal particles - Sludge - Water which is one product of combustion - High temperatures causing oxidation Any 3 x 1 (3 marks)	
(b)	 - Drawing correct diagram = 3 marks - Labelling any FOUR parts 4½ = 2 marks - Indicating direction of gear rotation 2 x ½ = 1 **Total = (6 marks)** - The driving gear shaft is rotated by crankshaft and in turn rotates the idling gear. (1 mark) - The two gears turn in a manner that they enmesh on the suction side creating a partial vacuum. (1 mark) - Atmospheric pressure on the oil sump forces oil to enter the pump, filling the spaces between the teeth. (1 mark) - When the teeth mesh again in the pumping side, oil is forced out through pump outlet to the main gallery. (1 mark)	

15 (a)	(i) Torsional bar (1 mark)	
	(ii) A - damper B - torsion bar C - stub axle D - splines E - clamp to clasis F - lower suspension arm 6 x½ = (3 marks)	
(iii)	- One end of the torson bar is splined into the suspension link, while the other is located onto the vehicle's chassis member. (1 mark) - The amount of static twist imposed upon the bar can be varied by means of an adjuster or by altering the splined location. (1 mark) - When the road wheel is deflected by an uneven road surface, the supervision link twists the torson bar. (2 marks) - The fixed opposite end creates an opposition force which limits the amount twist and hence suspension movement. (2 marks)	
(b)	- Excessive tyre pressure - Defective shock absorber - Excessive friction - Vehicle overload or unevenly loaded - Out-of-round tyre - Broken spring - Unequal tyre pressure Any 5 x 1 =(5 marks)	