

29.19 POWER MECHANICS (447)

29.19.1 Power Mechanics Paper 1 (447/1)



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SECTION A (40 marks)

- 1** (a) State **two** types of fire extinguishers used to put out fire caused by oil. (1 mark)
- (b) State **two** characteristics of liquid pressure. (1 marks)
- 2** (a) Name **three** areas in an engine where a torque wrench should be used. (1½ marks)
- (b) Give **two** reasons for using cast iron in the construction of engine blocks. (2 marks)
- 3** (a) State **two** advantages of the integral type of vehicle body over the separate chassis type. (2 marks)
- (b) Use labelled sketches to show the difference between camber and kingpin inclination. (2 marks)
- 4** (a) List **four** types of springs used in motor vehicle suspension systems. (2 marks)
- (b) With the aid of sketches, differentiate between countersinking and counterboring. (2 marks)
- 5** (a) (i) Explain the term viscosity as applied to lubricating oil.
- (ii) State **two** areas of application of low viscosity oil in a motor vehicle. (2 marks)
- (b) For each of the following sparking plug problems, state **one** possible cause:
- (i) wet oily deposit;
- (ii) sooty black deposit. (2 marks)
- 6** (a) Explain the effects of each of the following maladjustments in an engine:
- (i) inlet valve clearance too small;
- (ii) exhaust valve clearance too big. (3 marks)

(b) Calculate the compression ratio of a single cylinder engine with the following measurements:

- (i) stroke 100mm;
- (ii) bore 100mm;
- (iii) clearance volume 100cc.

(3 marks)

7 (a) State the function of each of the following parts of a vehicle gear box:

- (i) synchroniser;
- (ii) idler gear;
- (iii) fork.

(3 marks)

(b) Sketch the symbols for each of the following electrical devices:

- (i) lamp;
- (ii) starter motor;
- (iii) zener diode;
- (iv) capacitor.

(2 marks)

8 (a) List **two** measurements which are normally taken during the inspection of each of the following parts:

- (i) valve spring;
- (ii) camshaft.

(2 marks)

(b) (i) State **one** disadvantage of using acid flux when soldering.

(ii) State the composition of soft solder.

(2 marks)

9 Explain each of the following terms as applied to engine operation:

- (a) valve lead;
- (b) valve lag;
- (c) valve overlap.

(4½ marks)

10 Draw the symbols used to represent each of the following machine parts in assembly drawing:

- (a) external screw thread;
- (b) splined shaft;
- (c) cylindrical tension spring.

(3 marks)

SECTION B (60 marks)

Answer question 11 and any other three questions from this section.
Candidates are advised to spend not more than 25 minutes on question 11.

11 Figure 1 shows two orthographic views of an object drawn in third angle projection.

On the drawing paper provided, draw an oblique view of the object taking XX as the front face.
Indicate three leading dimensions. (15 marks)

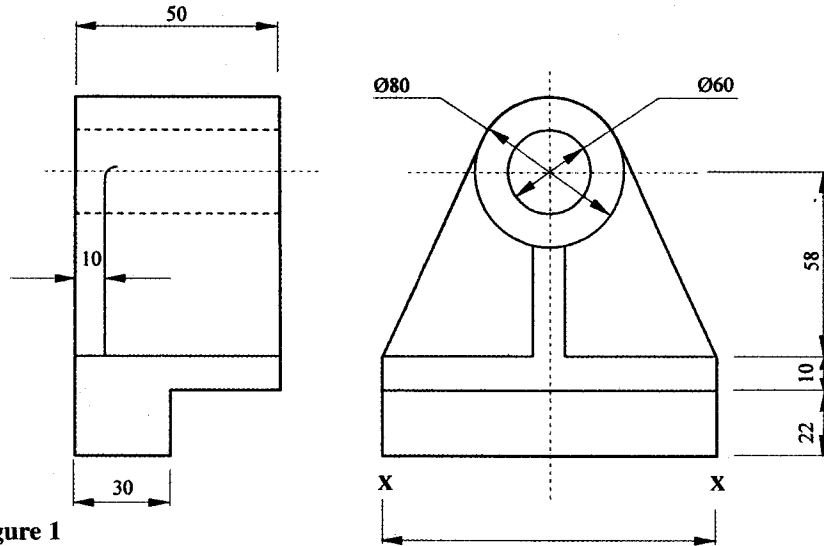


Figure 1

- 12 (a) State four service checks performed on engine valves. (2 marks)
- (b) Explain how a radiator is tested for leakage using water. (4 marks)
- (c) Outline the procedure of detecting and correcting misfiring spark plug on a running multicylinder engine. (9 marks)

- 13 (a) State **three** advantages of pneumatic brakes over hydraulic brakes. (3 marks)
- (b) Figure 2 shows a cross-sectional view of a brake master cylinder.

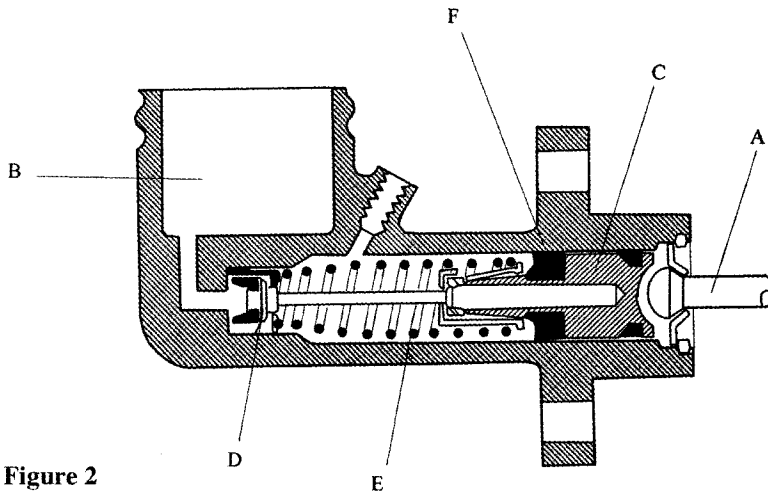


Figure 2

Name the parts labelled A, B, C, D, E and F.

(3 marks)

(c) Explain the operation of the master cylinder.

(9 marks)

- 14 (a) State **three** qualities of effective steering system of a motor vehicle. (3 marks)

(b) Outline **four** preliminary checks carried out before vehicle wheel alignment.

(4 marks)

(c) With the aid of a labelled sketch, explain the construction and operation of the rack and pinion steering box.

(8 marks)

- 15 (a) List **three** operational requirements of a propeller shaft. (3 marks)

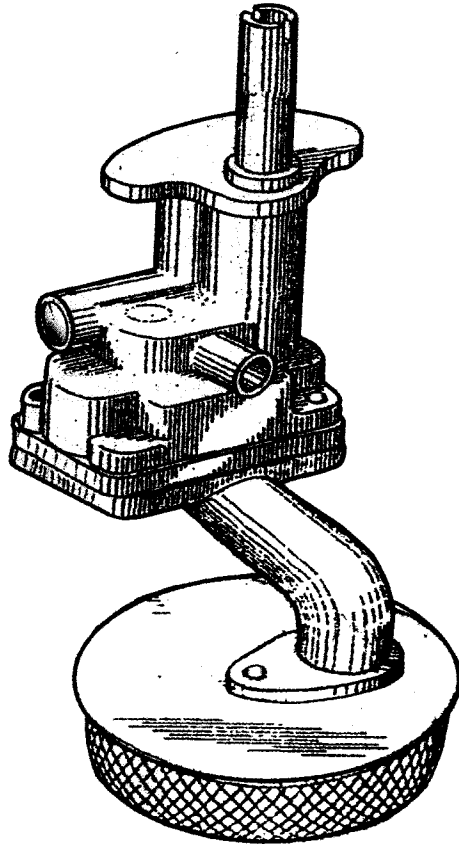
(b) Outline the procedure of removing, servicing and assembling a propeller shaft of a vehicle.

(12 marks)

29.19.2 Power Mechanics Paper 2 (447/2)

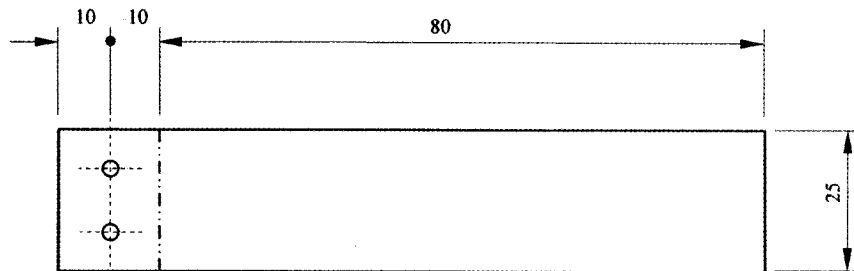
STATION 1

The figure below shows a pictorial view of the gear type oil pump. In the drawing paper provided, sketch in good proportion the exploded view of the pump and label all the parts. (10 marks)

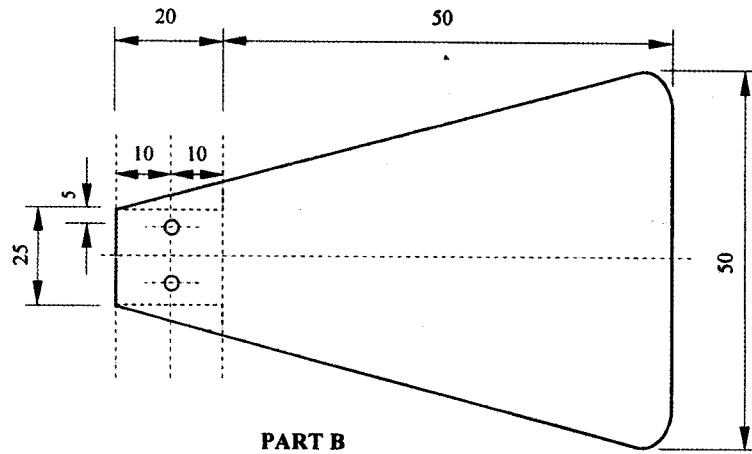


STATION 2

Using the tools, materials and equipment provided, make the scraper as shown in the figure below. (10 marks)



PART A



PART B

STATION 3

On the single cylinder engine provided, carry out the following tasks:

- (a) remove the inlet valve;
- (b) lap the valve;
- (c) reassemble the valve.

(10 marks)

Let the examiner check your work.

STATION 4

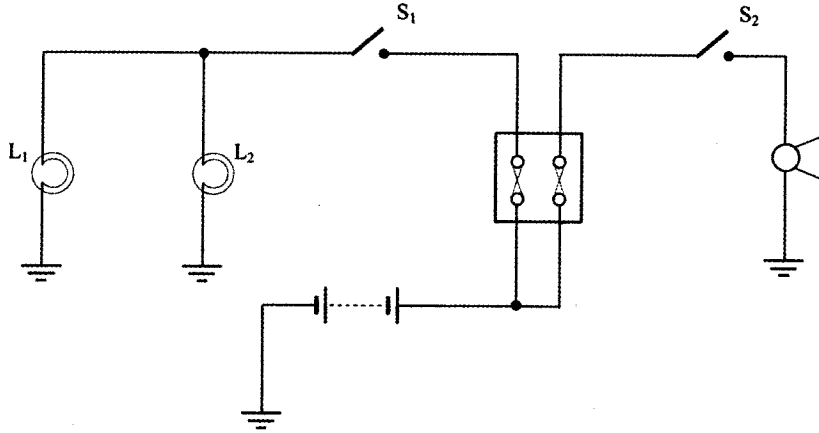
Identify the tools and fasteners labelled A to J and state one use of each.

(10 marks)

ITEM	NAME	USE
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		

STATION 5

Using the components and connecting leads provided, connect the vehicle electrical circuit as shown in the figure below.



Let the examiner check your work.

(10 marks)

STATION 6

(a) Demonstrate to the examiner how to test the cylinder head provided for warpage.

(4 marks)

(b) For the piston provided determine:

(i) taper;

(ii) ovality.

(6 marks)

STATION 7

Change the wheel marked on the vehicle provided.

Let the examiner check your work.

(10 marks)

STATION 8

Using the measuring tools provided, take and record each of the measurements listed below:

	PART AND MEASUREMENT REQUIRED	READING
(a)	Valve: (i) length	_____
	(ii) margin width	_____
	(iii) stem diameter	_____
	(iv) head diameter	_____
(b)	Valve spring free length	_____
(c)	Piston ring: (i) free gap	_____
	(ii) width	_____
	(iii) working gap	_____

(10 marks)

STATION 9

Name the parts labelled K to P. For each part, identify one defect and one possible cause and complete the table below.

(10 marks)

PART	NAME	DEFECT	CAUSE
K			
L			
M			
N			
P			

STATION 10

On the multicylinder engine provided carry out the static ignition timing given the firing order as 1342.

(10 marks)

Let the examiner check your work.