

### 3.19 POWER MECHANICS (447)

#### 3.19.1 Power Mechanics Paper 1 (447/1)

##### SECTION A (40 marks)

Answer *all* the questions in this section in the spaces provided.

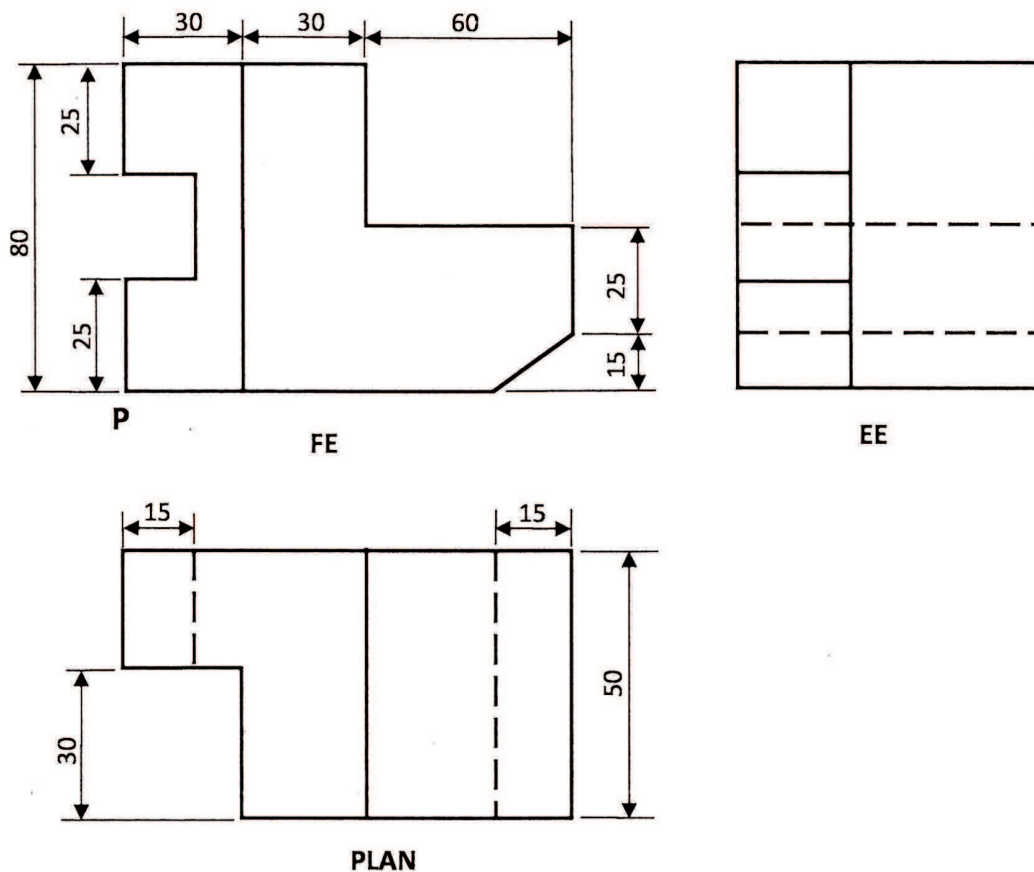
- 1 (a) Outline **six** key steps in the entrepreneurship process. (3 marks)
- (b) List **four** areas where ventilation is necessary in a power mechanics workshop. (2 marks)
- 2 (a) State **two** ethical conducts to be observed by a power mechanics technician. (1 mark)
- (b) Make a free-hand sketch of a self-tapping screw. (2 marks)
- 3 Outline **four** constructional differences between a four stroke single cylinder SI engine and a four stroke single cylinder C.I engine. (4 marks)
- 4 (a) State **two** advantages of air brakes over hydraulic brakes. (2 marks)
- (b) Explain why:
- (i) the split washer has offset ends; (1 mark)
- (ii) the tab washer has a square projection on the inner edge. (1 mark)
- 5 (a) State **two** possible causes for a faint horn sound. (2 marks)
- (b) List **two** operational differences between the DC generator and the alternator. (2 marks)
- 6 (a) Explain the term “spring weight” as applied to leaf springs. (2 marks)
- (b) With respect to a single cylinder engine, differentiate between “make” and “model”. (2 marks)
- 7 (a) With the aid of a sketch, illustrate the type of tyre wear pattern caused by under inflation. (1 mark)
- (b) Explain the following properties of ferrous metals:
- (i) toughness; (1 mark)
- (ii) hardness. (1 mark)
- 8 (a) State **two** functions of the fuel tank cap on a single cylinder engine. (2 marks)
- (b) With the aid of diagrams, illustrate the difference between the vanes of a fluid coupling and a torque converter.

- 9 (a) Name **four** types of pliers. (2 marks)
- (b) List **four** thermal processes used for joining metals. (2 marks)
- 10 (a) Distinguish between the **two** types of engine block construction. (2 marks)
- (b) Explain the meaning of “steering geometry”. (3 marks)

**SECTION (60 marks)**

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

- 11 **Figure 1** shows three orthographic views of a block drawn in first angle projection.

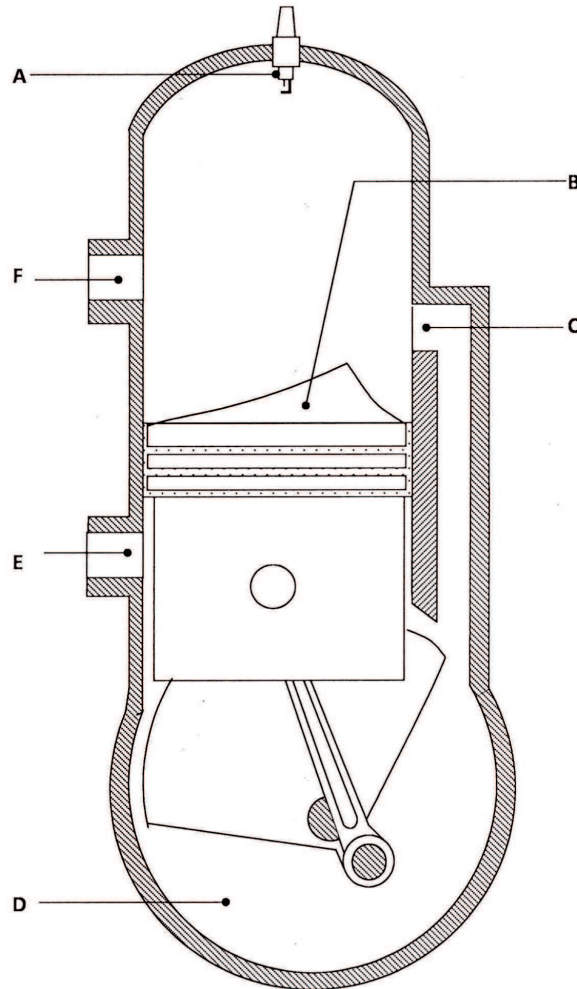


**Figure 1**

On the grid paper provided draw the block FULL SIZE in isometric projection taking P as the lowest point. (15 marks)

- 12 (a) List the accessories and equipment used in arc welding. (5 marks)
- (b) Outline the procedure for arc welding a butt joint. (10 marks)

13 **Figure 2** shows the three point type of a 2-stroke cycle petrol engine.



**Figure 2**

- (a) Name the parts labelled **A** to **F**. (3 marks)
- (b) Explain how the engine operates. (12 marks)

14 (a) The oil pressure warning light of a vehicle remains on when the engine is running. Outline **three** checks that may be performed on the lubrication system to establish the cause of the fault. (3 marks)

- (b) With the aid of a circuit diagram, explain the operation of a two terminal flasher unit. (12 marks)

15 (a) Name **four** types of gears. (2 marks)

- (b) Name **two** functions of a gear box in a vehicle. (2 marks)

- (c) With the aid of a labelled sketch, explain the power flow in a three-speed sliding mesh gearbox engaged in second gear. (11 marks)

3.19.2 Power Mechanics Paper 2 (447/2)

STATION 1

In the space below, sketch in good proportion a sectional view of a sparking plug. Label **four** parts. (10 marks)

STATION 2

Using the tools, equipment and materials provided, fabricate the support bracket shown in figure 2. (10 marks)

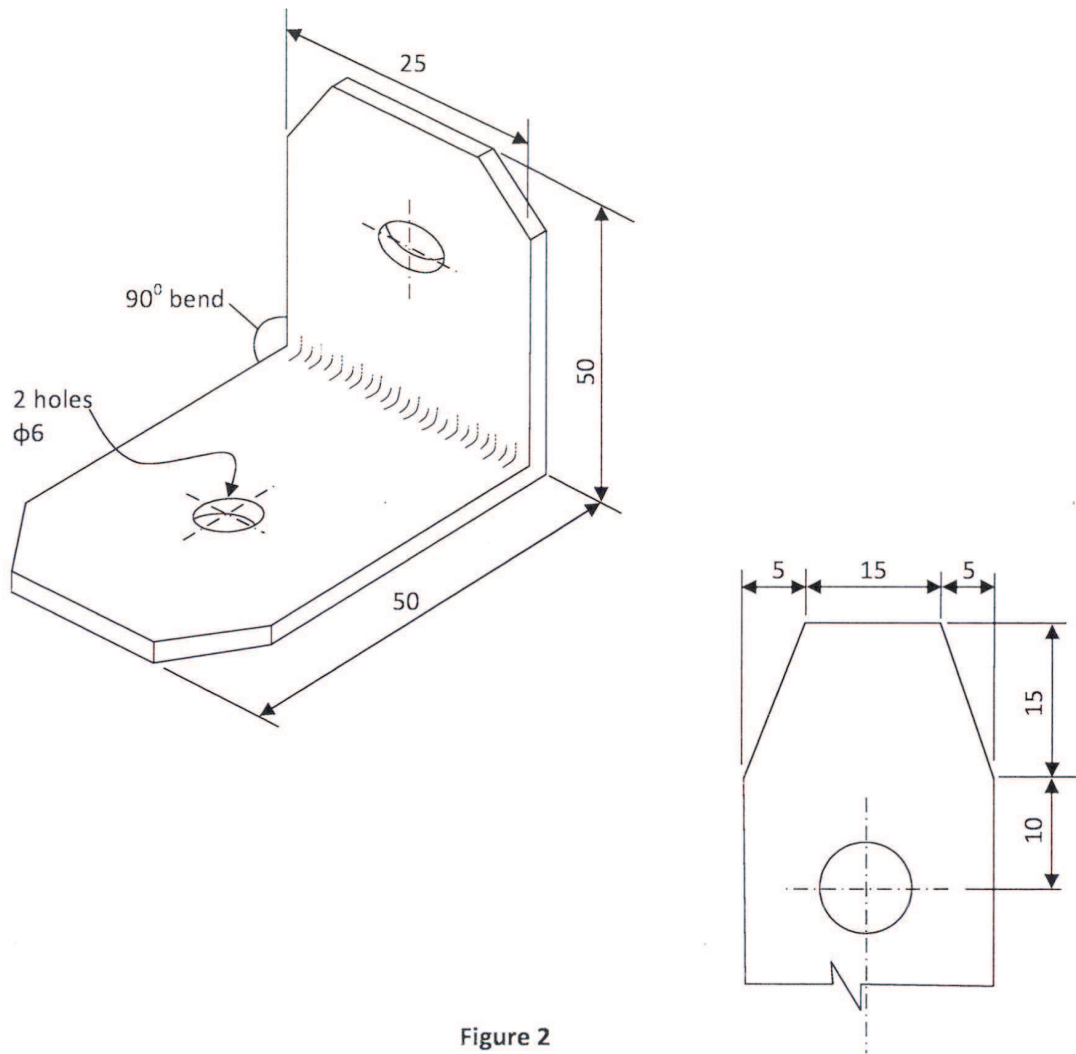


Figure 2

### STATION 3

Identify the items labelled A to E. For each item:

- (a) state the material it is made of;
- (b) name its use in a motor vehicle.

(10 marks)

Complete Table 1

Table 1

	ITEM	MATERIAL	USE
A			
B			
C			
D			
E			

### STATION 4

On the piston provided, perform the following tasks:

- (a) measure the side clearance of the piston ring;
- (b) remove the ring from the piston;
- (c) measure the free gap of the ring;
- (d) measure the working gap of the ring;
- (e) fit the ring back into the piston.

(10 marks)

(Let the examiner check your work)

**STATION 5**

Using the tools and materials provided, connect the ignition circuit of a motor vehicle using one sparking plug.

(10 marks)

(Let the examiner check your work)

**STATION 6**

Identify the parts labelled K, L, M, N and O. Name the vehicle system in which each part is used. For each part, identify one defect and state its effect on vehicle performance.

Complete Table 2

Table 2

PART	NAME	VEHICLE SYSTEM	DEFECT	EFFECT
K				
L				
M				
N				
O				

(10 marks)

### STATION 7

On the gas welding equipment provided,

- (a) Identify the parts labelled P, Q, R, S and T. (2½ marks)

PART	NAME
P	
Q	
R	
S	
T	

- (b) Without adjusting the regular pressure, light the equipment and set the torch to obtain an oxidising flame. (6½ marks)
- (c) Shut down the gas equipment. (1 mark)

### STATION 8

- (a) For the single cylinder engine provided, measure and record the following:
- (i) bore \_\_\_\_\_
- (ii) stroke \_\_\_\_\_ (2 marks)
- (b) Calculate the compression ratio of the engine if the clearance volume is taken to be 10% of the displacement volume. (8 marks)

**STATION 9**

On the multicylinder engine provided;

- (a) remove the fanbelt;
- (b) identify two defects on the fanbelt and state one possible cause of each defect;
- (c) state the correct remedy for each defect;
- (d) re-fit the fanbelt.

(10 marks)

**STATION 10**

On the battery provided, perform the following operations:

- (a) measure and record the specific gravity and battery voltage of each cell in Table 3.  
(Take cell number 1 to be next to the positive terminal)

**Table 3**

Cell Number	Specific Gravity	Battery Voltage
1		
2		
3		
4		
5		
6		

- (b) Check and comment on the state of:

(i) battery electrolyte level .....

(ii) battery charge .....

(10 marks)