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. (2 marks)

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.

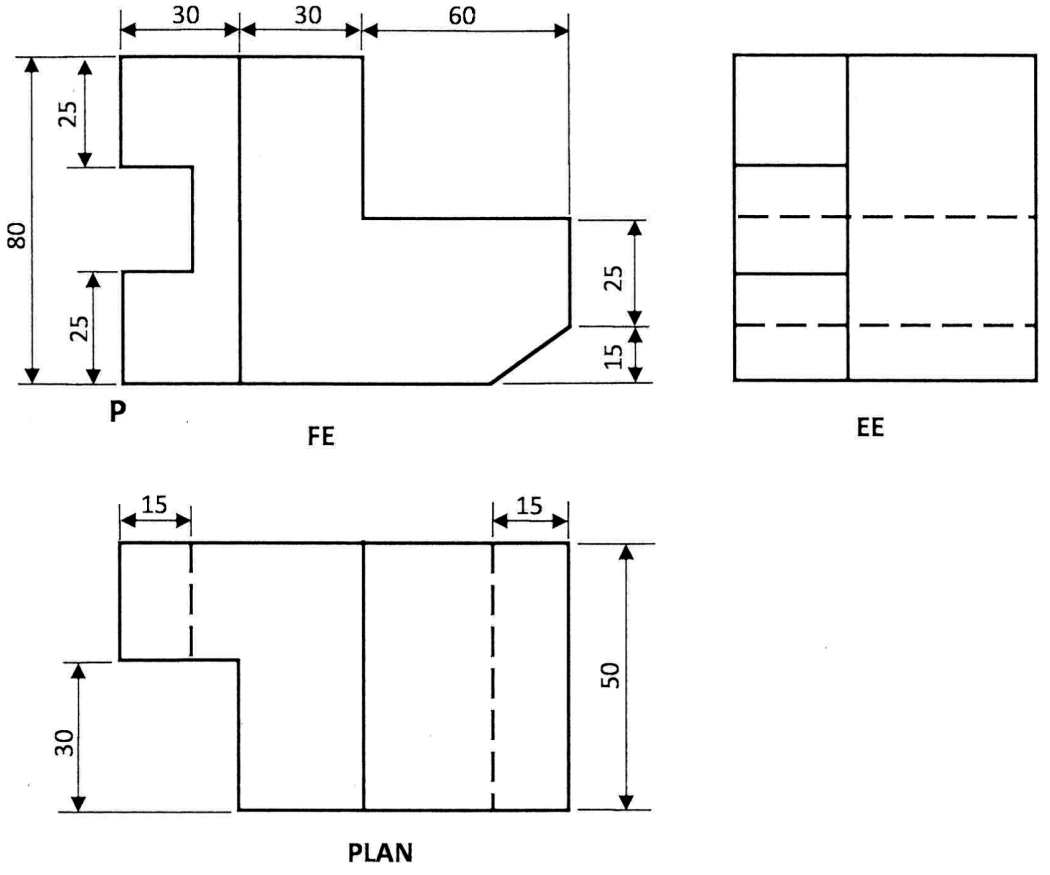

Figure 1

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.

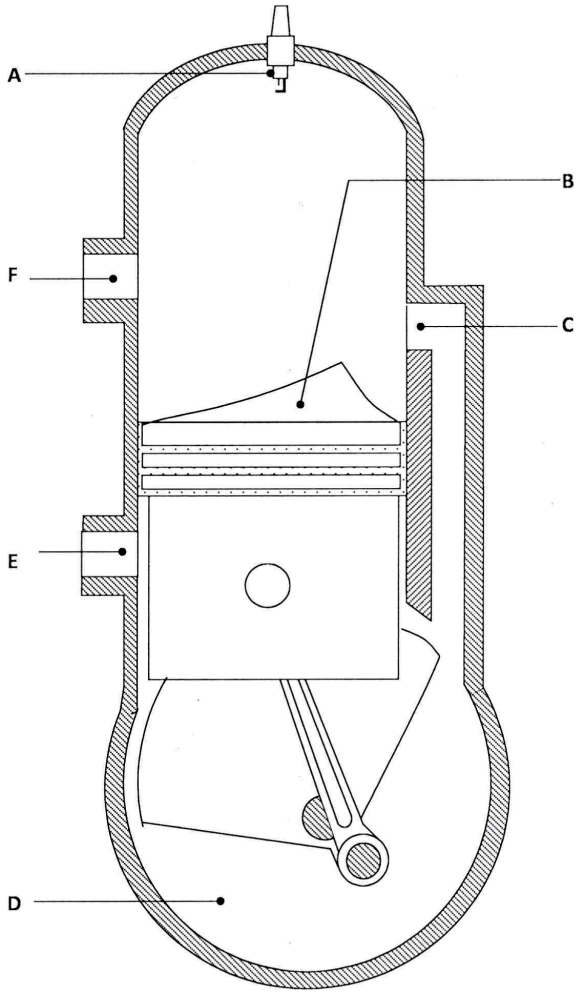

Figure 2

(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)

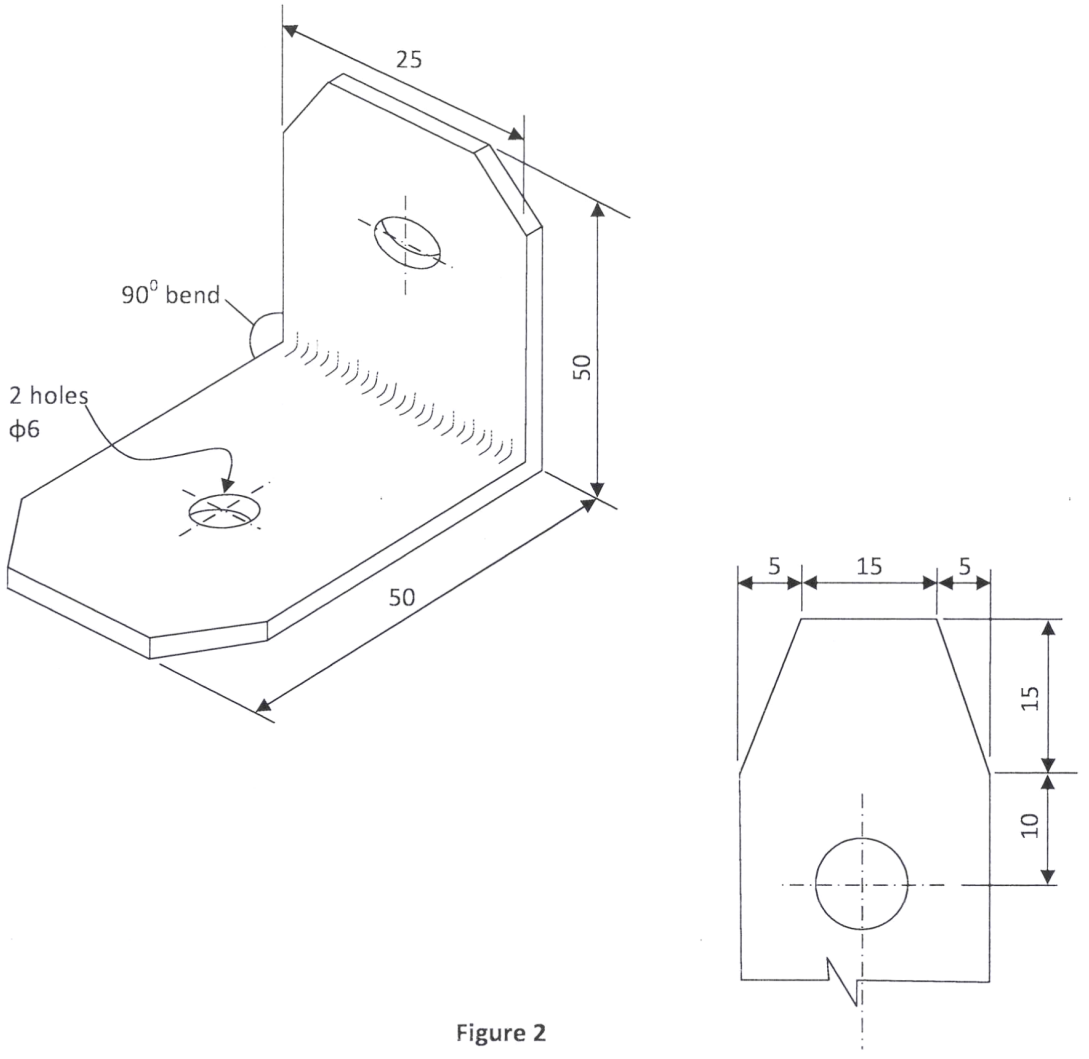

Figure 2

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. ($2\frac{1}{2}$ 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. ($6\frac{1}{2}$ 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)