4.5 POWER MECHANICS (447)

4.5.1 Power Mechanics Paper 1 (447/1)

SECTION A (40 marks)

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

1 (a) Define power mechanics. (1 mark)

(b) List **four** types of common body cuts. (2 marks)

2 (a) State **one** advantage of tubeless tyres over tubed tyres. (1 mark)

(b) State **three** reasons for writing a business plan. (3 marks)

3 (a) The nominal size of a Gudgeon pin is 50 mm. If the tolerance is 0.0825 mm, determine its limits. (2 marks)

(b) Explain the functions of a multimeter and state how it is connected in each case. (3 marks)

4 (a) State the function of each of the following devices in a motor vehicle:

(i) split pin; (1 mark)

(ii) internal snap ring. (1 mark)

(b) Explain **two** reasons for alloying metals. (2 marks)

5 (a) State **two** operational differences between an alternator and a generator. (2 marks)

(b) State **two** disadvantages of external combustion engine over internal combustion engine. (2 marks)

6 (a) Name **four** parts of an automatic transmission system. (2 marks)

(b) Draw a labelled circuit diagram of the courtesy light circuit. (3 marks)

7 (a) State **two** types of each of the following:

(i) welding rods; (1 mark)

(ii) brazing rods; (1 mark)

(iii) fluxes. (1 mark)

8 (a) With the aid of a sketch, explain the term negative caster angle. (2 marks)

(b) Explain how a stabilizer bar works. (2 marks)

9 (a) List **four** main components driven by the crankshaft in a multi-cylinder engine. (2 marks)

(b) State **two** precautions to observe when fitting a new cylinder head gasket. (2 marks)

10 **Figure 1** shows a single cylinder engine carburettor.

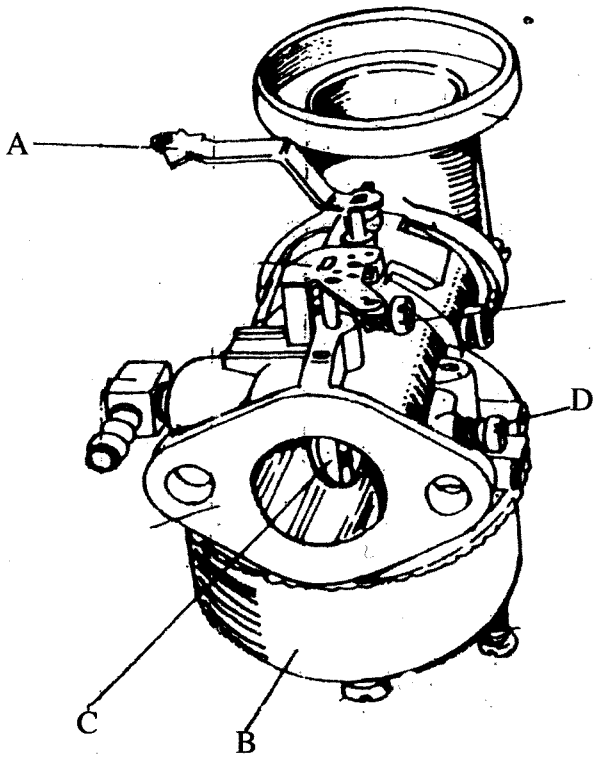


Figure 1

Name the parts labelled **A**, **B**, **C** and **D** and state the function of each part. (4 marks)

A .....

B .....

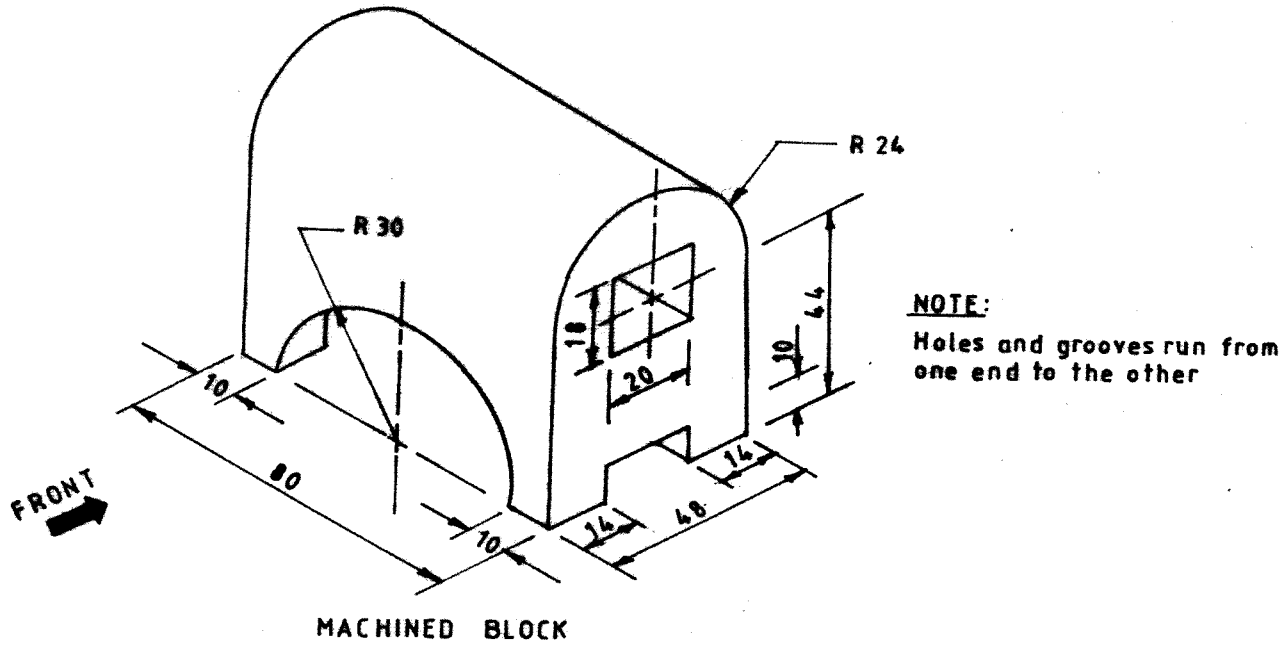
C .....

D .....

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 2** shows a machined block.



Draw, full size in first angle projection the following views:

(12 marks)

(a) front elevation;
(b) end elevation;
(c) plan.

Indicate **six** leading dimensions. (3 marks)

(Use A_3 provided)

12 (a) List **ten** components which should be disconnected before removing an engine from a vehicle. (5 marks)

(b) A spark ignition multicylinder engine runs but misfires.

(i) State **five** possible causes of misfiring; (5 marks)
(ii) Outline the procedure of identifying the misfiring cylinder. (5 marks)

13 (a) State **three** provisions required when designing a power mechanics workshop. (3 marks)

(b) Sketch a layout of a power mechanics workshop showing its main areas of operation. **(Use A_3 provided)** (12 marks)

14 (a) State **five** types of care practices that enhance the life span of tyres. (5 marks)

(b) Outline the procedure of changing a flat wheel of a vehicle. (10 marks)

15 **Figure 3** shows a dual master cylinder.

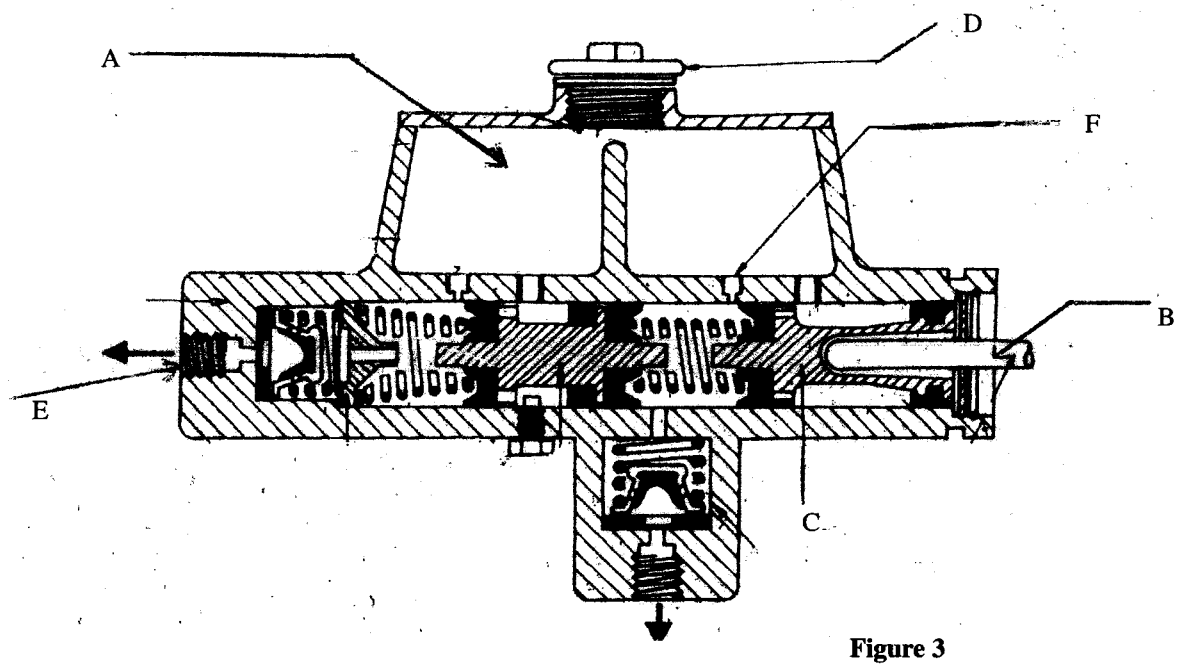


Figure 3

(a) Name the parts labelled **A**, **B**, **C**, **D**, **E**, and **F** (3 marks)

(b) Explain the operation of the dual master cylinder under the following conditions:

(i) normal operation;
(ii) front brakes failure;
(iii) rear brakes failure.

(12 marks)

4.5.2 Power Mechanics Paper 2 (447/2)

STATION 1

In the space below, sketch in good proportion an exploded drawing of a connecting rod assembly. Lable **four** parts. (10 marks)

STATION 2

Using the tools, materials and equipment provided, make the template shown in **figure 1** below. (10 marks)

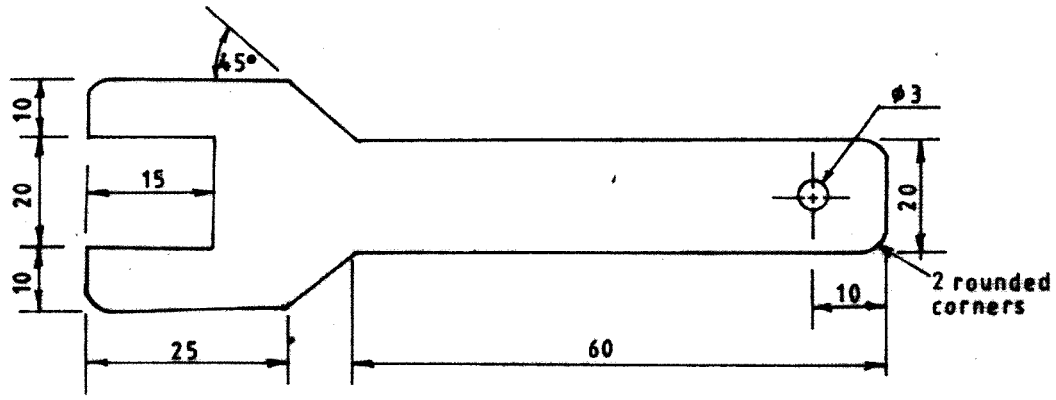


Figure 1

STATION 3

Identify the parts labelled **M**, **N**, **O**, **P** and **Q** and name the motor vehicle system in which each is used. For each part, identify one defect and state its effect on vehicle performance. Complete the table below. (10 marks)

PART	NAME	VEHICLE SYSTEM	DEFECT	EFFECT
M				
N				
O				
P				
Q				

STATION 4

On the single cylinder engine provided, determine the big-end bearing clearance at a torque of $25kN/m^2$.

Let the examiner check your work. (10 marks)

STATION 5

Dismantle the oil pump provided. Measure and record the following:

(i) rotor - body clearance
(ii) tip clearance

Reassemble the pump and test it for functionality.

Let the examiner check your work. (10 marks)

STATION 6

On the drum brake of the vehicle provided:

(a) remove the return spring.
(b) measure the tension of the spring.
(c) replace the return spring

Let the examiner check your work. (10 marks)

STATION 7

Using the tools, materials and components provided, connect a three-lamp lighting circuit such that two lamps are in series while the third lamp is in parallel.

Let the examiner check your work. (10 marks)

STATION 8

On the vehicle provided:

(a) identify the parts labelled X, Y and Z. (3 marks)
(b) determine the toe-in of the vehicle. (7 marks)

Let the examiner check your work.

STATION 9

Using the tools and materials provided, mend the hole marked on the tube.

Let the examiner check your work. (10 marks)

STATION 10

On the multicylinder engine provided, carry out the following tasks:

(a) check and comment on the condition of the spark plug for cylinder number 3. (3 ½ marks)
(b) service the spark plug.

Let the examiner check your work. (6 ½ marks)