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) State **one** reason for studying power mechanics. (1 mark)

(b) Outline **six** components of a marketing plan of a business plan. (3 marks)

2. (a) List **four** contents of a first aid box. (2 marks)

(b) Make a sketch of a double cut flat file. (2 marks)

3. (a) Name **four** hydraulic tools used in a power mechanic workshop. (2 marks)

(b) Identify **four** parts of a motor vehicle that are made of cast iron. (2 marks)

4. (a) Explain the energy conversion processes that takes place in the braking system of a vehicle. (2 marks)

(b) Explain **two** characteristics of wing nuts as locking devices. (2 marks)

5. (a) State **two** functions of an air cleaner. (2 marks)

(b) Identify **four** causes of low compression in a spark ignition single cylinder engine. (2 marks)

6. (a) Outline **four** methods used in engine cooling systems. (2 marks)

(b) Explain the term *'back flushing'* with respect to engine cooling system. (2 marks)

7. (a) State **four** desirable properties of a clutch centre plate lining material. (2 marks)

(b) State **three** requirements that should be observed to achieve effective soft soldering. (3 marks)

8. (a) Explain the function of the *filler rod* during gas welding. (2 mark)

(b) Outline **two** essential practices observed when soft soldering in order to achieve high quality joints. (2 marks)

9. (a) State **two** disadvantages of a riveted shoe lining over a bonded shoe lining. (2 marks)

(b) State **one** function of tyre tread. (1 mark)

10. (a) Explain **one** advantage of coil springs over leaf springs in vehicle suspension systems. (2 marks)

(b) Explain the purpose of ball joints in the steering system. (2 marks)

SECTION B (60 marks)

*Answer question **11** on the **A3** paper provided and any other **three** questions from this section in the spaces provided.*
*Candidates are advised to spend **not** more than **25 minutes** on question **11**.*

11. **Figure 1** shows an isometric drawing of a bracket.

On the ***A3*** paper provided, draw **FULL SIZE**, in first angle orthographic projection the following views:

(a) Front Elevation in the direction of arrow **W**

(b) End elevation in the direction of arrow **X**

(c) Plan (15 marks)

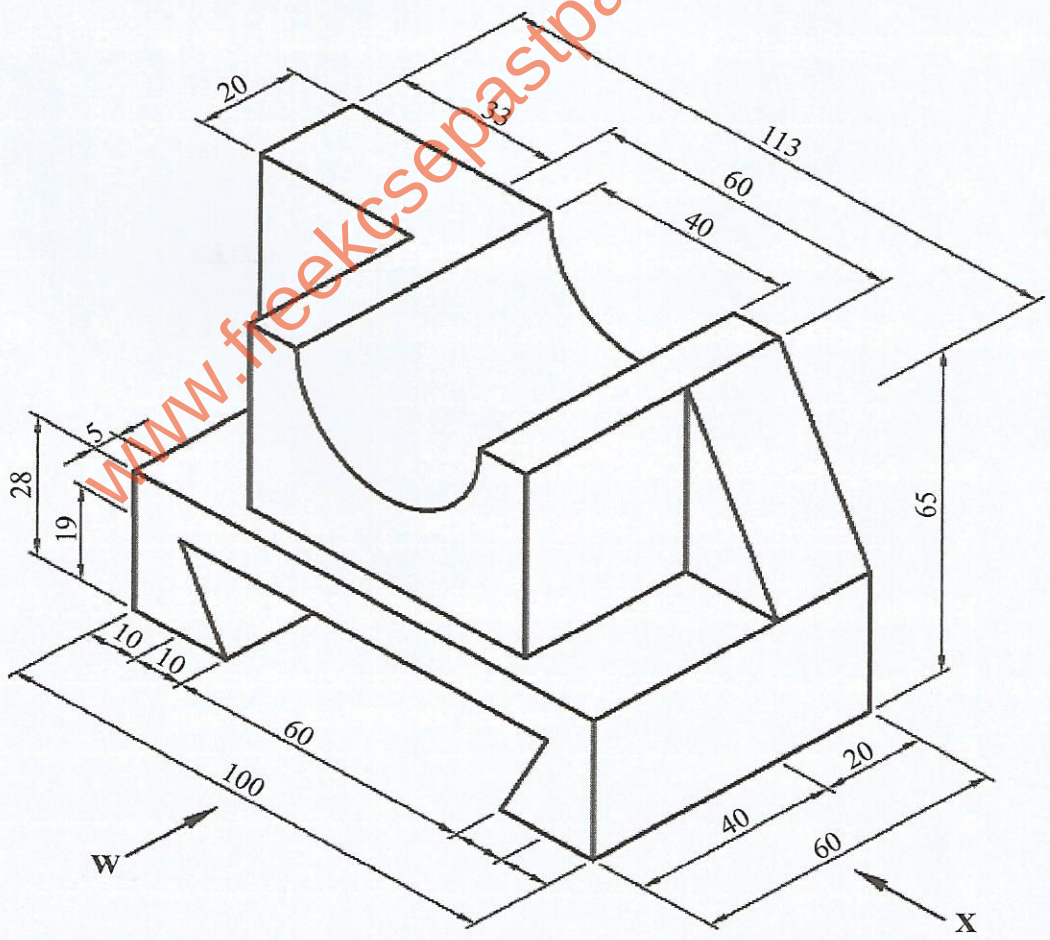

Figure 1

12. **Figure 2** shows a diagram of a multicylinder engine.

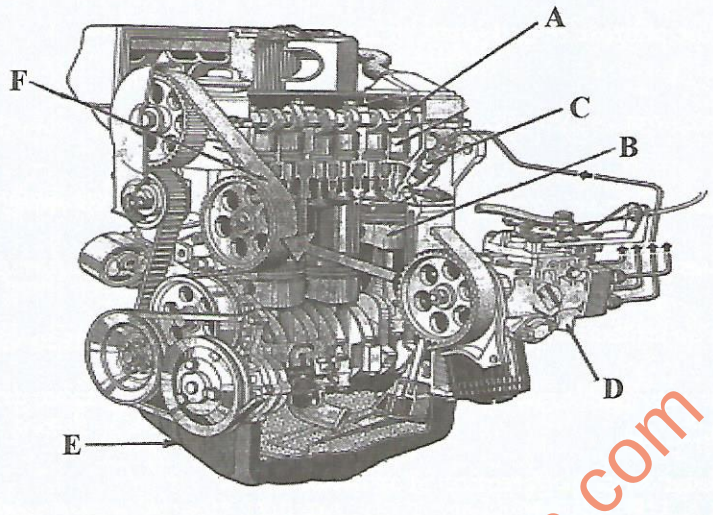

Figure 2

(a) Identify the type of engine by:

(i) type of fuel used (1 mark)

.....

(ii) arrangement of the cylinders (1 mark)

.....

(iii) arrangement of the valves (1 mark)

.....

(b) Name the parts labelled **A** to **F**. (3 marks)

A .....

B .....

C .....

D .....

E .....

F .....

(c) Explain the operation of the valve system of this engine. (9 marks)

13. (a) State the meaning of the following designation on a tyre: ***205/65R15/94T.*** (5 marks)

(b) **Figure 3** shows a component of the suspension system.

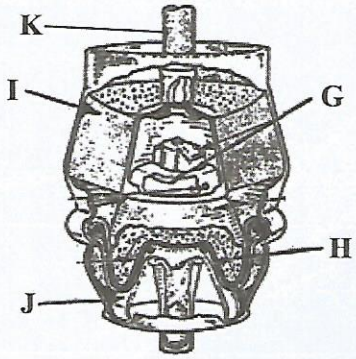

Figure 3

(i) Name the component. (½ mark)

(ii) Identify the parts labelled **G, H, I, J** and **K.** (2½ marks)

(iii) Explain the operation of the component under each of the following road conditions:

I. Pitch (5 marks)

II. Bounce (2 marks)

14. (a) Outline **six** regular maintenance checks carried out on water cooling systems. (3 marks)

(b) With the aid of a labelled diagram, explain the operation of an impeller water pump. (12 marks)

15. (a) (i) Differentiate between clutch slip and clutch judder. (4 marks)

(ii) List **five** causes of clutch slip when the clutch is engaged. (5 marks)

(b) (i) Explain the term '***coupling point***' with respect to a torque convertor. (1 mark)

(ii) Outline **five** drive transmission conditions that can be achieved by the planetary gear set of an automatic gearbox. (5 marks)

4.5.2 Power Mechanics Paper 2 (447/2)

STATION 1

In the space below, sketch in good proportion the exploded view of a *rear wheel leaf spring swing shackle*. (10 marks)

STATION 2

Using the materials and equipment provided, make the model scraper shown in **Figure 1**. (10 marks)

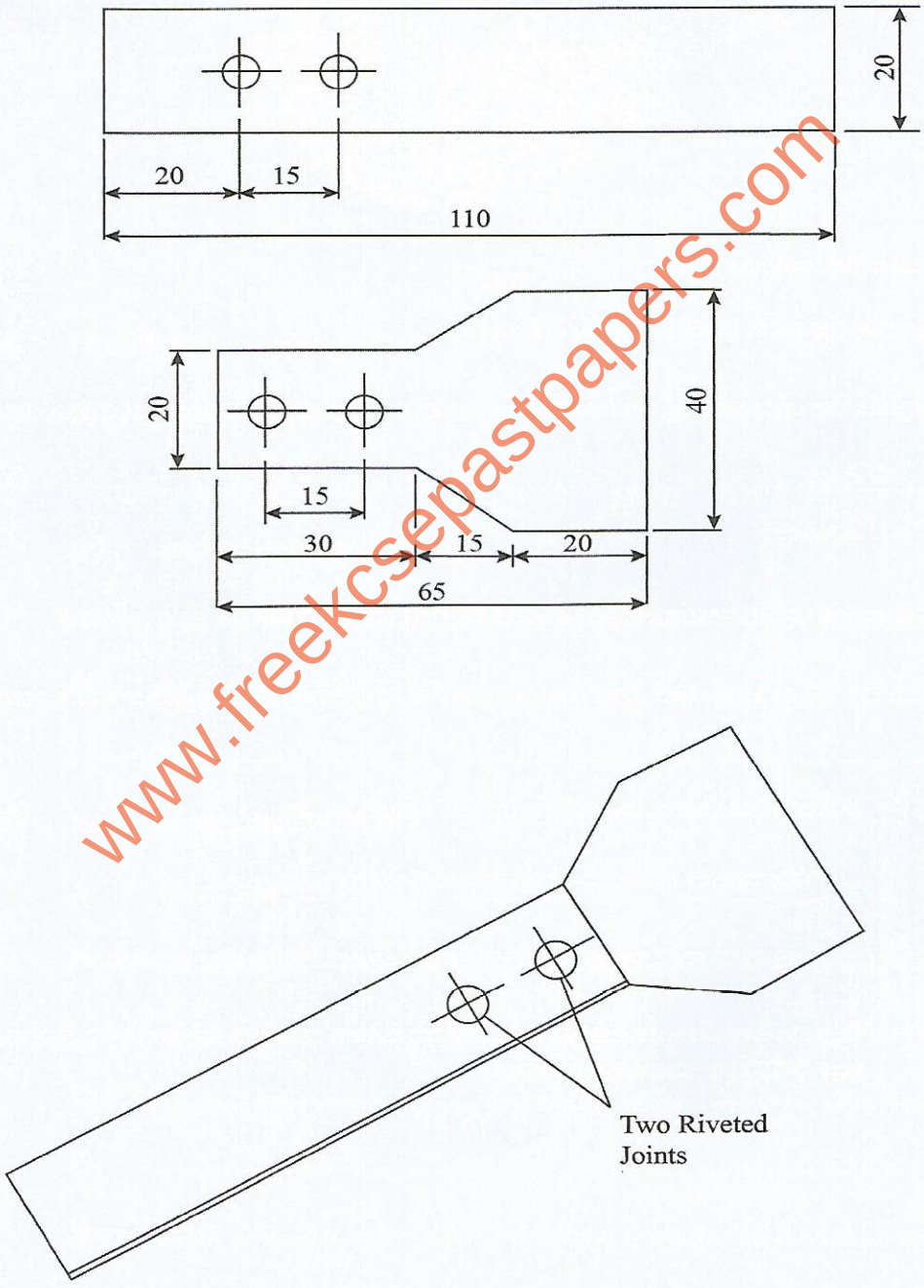

Figure 1

STATION 3

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		
J		

STATION 4

On the single cylinder engine provided, determine the big end oil clearance at a torque of 20 KN/m^2.
(10 marks)

LET THE EXAMINER CHECK YOUR WORK.

STATION 5

Using the tools, materials and components provided, connect a lighting circuit such that two lamps are of the same brightness while the other two lamps are of different brightness. (10 marks)

LET THE EXAMINER CHECK YOUR WORK.

STATION 6

Identify the parts labelled **K, L, M, N** and **P.** Name the vehicle system in which each part is used. For each part, identify **one** defect and state its effect on vehicle performance. (10 marks)

PART	NAME	VEHICLE SYSTEM	DEFECT	CAUSE
K				
L				
M				
N				
P				

STATION 7

On the braking system of the wheel identified, perform the following tasks:

(i) Identify the parts labelled **X** and **Y**.

(ii) Remove the brake pads and carry out visual check. Report the conditions of the pads to the examiner.

(iii) Replace the pads.

(10 marks).

LET THE EXAMINER CHECK YOUR WORK.

STATION 8

On the tyre provided, perform each of the following tasks:

(a) Identify the type of wear labelled **T** and state **one** possible cause.

.....

.....

.....

(b) Select the appropriate tool to measure and record the following:

Measurement	*Reading*	*Tool used*
Maximum tread depth		
Tyre width		
Tyre pressure		

(10 marks)

LET THE EXAMINER CHECK YOUR WORK.

STATION 9

On the multi-cylinder engine provided, perform each of the following tasks:

(a) Remove the fan belt.

(b) Examine the fan belt and comment to the examiner on its service condition.

(c) Refit the fan belt. (10 marks)

LET THE EXAMINER CHECK YOUR WORK.

STATION 10

Use the tools and materials provided to make the gasket for the part provided. (10 marks)

LET THE EXAMINER CHECK YOUR WORK.