

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 **two** safety measures observed when changing a tyre. (2 marks)
- (b) List **two** qualities of a person with integrity. (1 mark)
2. (a) List **three** motor vehicle related trades offered in vocational training institutions. (3 marks)
- (b) Sketch a hatchet bit used in a power mechanics workshop. (2 marks)
3. (a) (i) State **two** functions of flux during soldering. (2 marks)
- (ii) State the function of an oxyacetylene welding regulator. (1 mark)

- (b) **Figure 1** shows a vernier calliper.

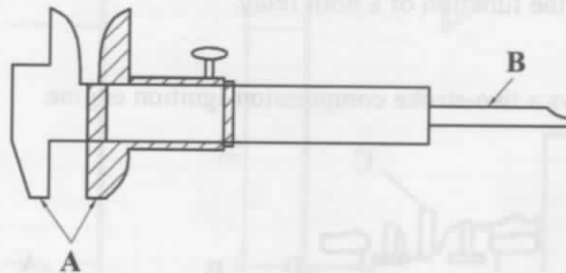


Figure 1

State the functions of the parts labelled **A** and **B**. (2 marks)

4. (a) Explain the meaning of each of the following fabrication processes:
 - (i) Forming; (1 mark)
 - (ii) Finishing. (1 mark)
- (b) Sketch each of the following locking devices:
 - (i) Tab washer; (1 mark)
 - (ii) Woodruff key. (1 mark)

5. (a) State **two** functions of the exhaust system of a motor vehicle. (2 marks)
- (b) Explain how valves are cooled when the engine is in operation. (2 marks)
6. (a) State **two** main functional requirements of a suspension system. (2 marks)
- (b) State the purpose of each of the following in a motor vehicle braking system:
- (i) Retarder; (1 mark)
- (ii) Adjuster. (1 mark)
7. (a) State the energy conversions that take place in each of the following vehicle components:
- (i) Photo voltaic cell; (1 mark)
- (ii) Horn. (1 mark)
- (b) (i) Name **two** types of starter motor field windings. (1 mark)
- (ii) Explain the function of a horn relay. (1 mark)
8. (a) **Figure 2** shows a two-stroke compression-ignition engine.

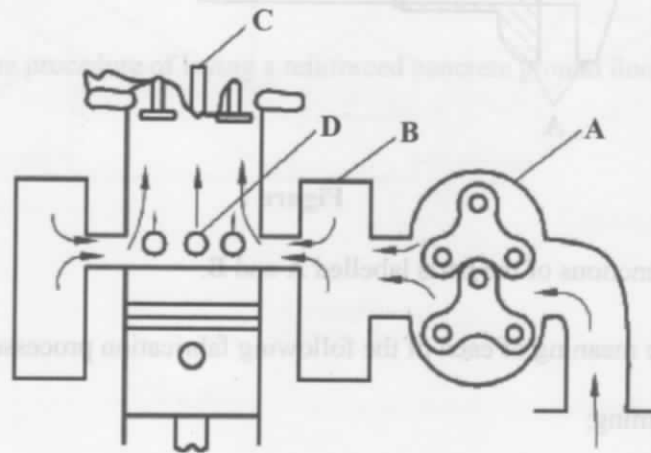


Figure 2

Name the parts labelled **A**, **B**, **C** and **D**. (2 marks)

(b) Explain the difference between a hotchkiss propeller shaft and a torque tube. (2 marks)

9. (a) State **one** possible cause of tyre shoulder wear. (1 mark)
- (b) Outline **two** possible causes of excessive play in the steering system. (2 marks)
10. (a) Explain why motor vehicles are fitted with mechanical parking brakes. (2 marks)
- (b) Explain each of the following engine terminologies:
- (i) Engine capacity; (1 mark)
- (ii) HP rating. (1 mark)

SECTION B (60 marks)

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

11. **Figure 3** shows three orthographic views of a block drawn in first angle projection.

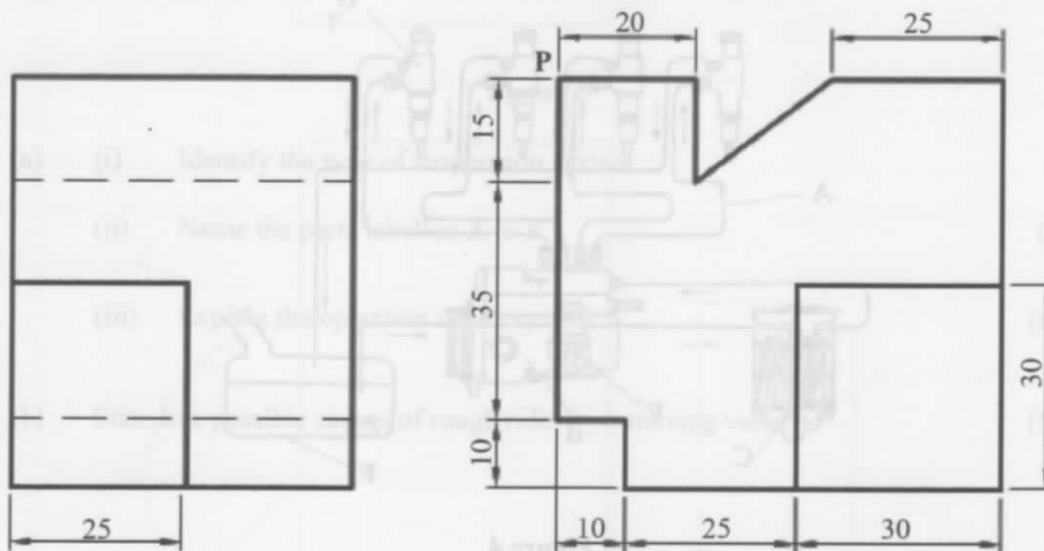


Figure 3

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

12. (a) Explain each of the following terms with respect to a motor vehicle battery:
- (i) Electrolyte; (1 mark)
 - (ii) Cathode; (1 mark)
 - (iii) Specific gravity. (1 mark)
- (b) Outline **three** types of maintenance carried out on a motor vehicle battery. (3 marks)
- (c) With the aid of a labelled diagram, explain the working principle of an ignition switch circuit with a ballast resistor. (9 marks)

13. (a) **Figure 4** shows the fuel system of a compression ignition engine.

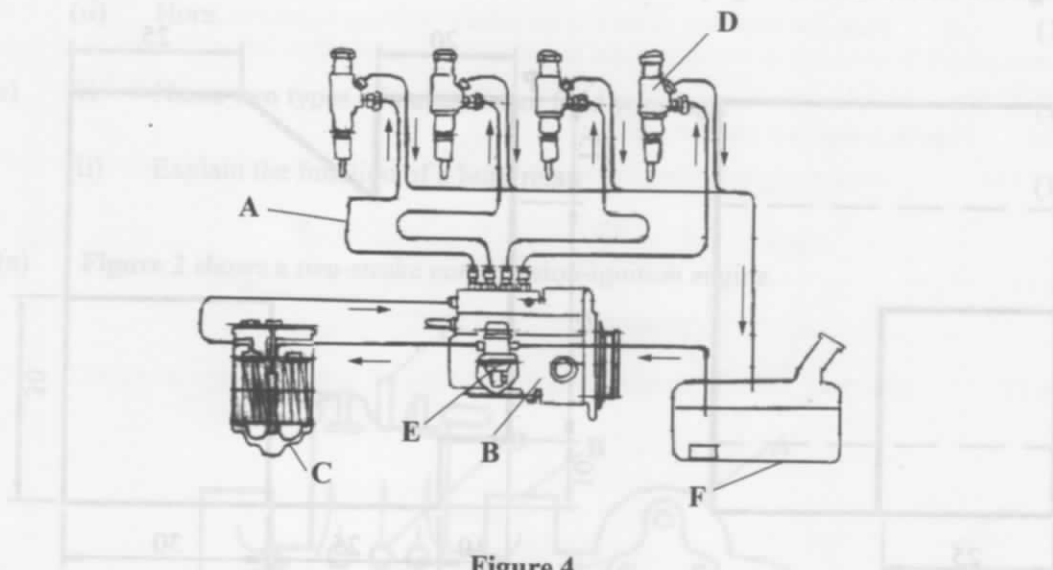


Figure 4

Name the parts labelled **A** to **F** and in each case, state **one** function. (10 marks)

- (b) Outline **two** possible ways through which air may enter the fuel system in 13(a). (2 marks)
- (c) (i) List **two** types of governors used in compression ignition engines. (1 mark)
- (ii) State **two** functions of a governor in the fuel system. (2 marks)
14. (a) (i) State **two** functions of positive crankcase ventilation. (2 marks)
- (ii) List **three** causes of oil deterioration in an engine. (3 marks)

- (b) With the aid of a labelled diagram, explain the operation of the gear type oil pump. (10 marks)

15. Figure 5 shows a type of suspension system.

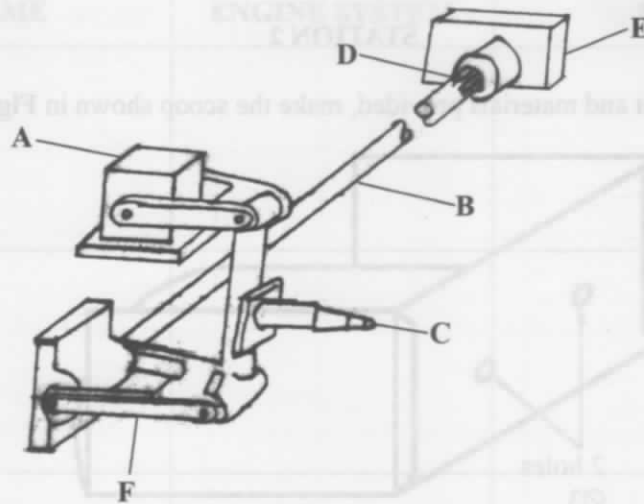


Figure 5

- (a) (i) Identify the type of suspension system. (1 mark)
- (ii) Name the parts labelled A to F. (3 marks)
- (iii) Explain the operation of the system. (6 marks)
- (b) State five possible causes of rough rides by a moving vehicle. (5 marks)