

3.20 POWER MECHANICS (447)

3.20.1 Power Mechanics Paper 1 (447/1)

SECTION A (40 marks)

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

- 1 (a) Explain the meaning of integrity. (1 mark)
- (b) Outline **six** characteristics that distinguish entrepreneurs from ordinary business people. (3 marks)
- 2 (a) State **two** safety precautions that should be observed when using electrical hand tools. (2 marks)
- (b) John intends to construct a plain scale whose representative fraction is 1:5, to read a minimum of 10 mm and a maximum of 800 mm. Calculate the length of the scale. (2 marks)
- 3 (a) Identify **four** cleaning tools used in a power mechanics workshop. (2 marks)
- (b) State the purpose of the following locking devices. (2 marks)
- (i) Grub screw
- (ii) Pal nut
- 4 (a) Explain the effect of adding the following alloys to steel. (2 marks)
- (i) Tungsten
- (ii) Chromium
- (b) Identify **four** areas in a motor vehicle where motors and generators are applied as energy convertors. (2 marks)
- 5 (a) Explain the difference between an undersquare engine and an oversquare engine. (2 marks)
- (b) List **four** causes of cylinder wall wear. (2 marks)
- 6 (a) List **four** components that must be disconnected from a multi-cylinder engine before it is disassembled. (2 marks)
- (b) Identify **four** types of mechanical force transmitters used in motor vehicles. (2 marks)



- 7 (a) Explain the importance of: (2 marks)
- (i) Inlet valve lead.
 - (ii) Exhaust valve lag.
- (b) State **two** advantages of using water as a coolant in multi-cylinder engines. (2 marks)
- 8 (a) State **two** advantages of a tungsten halogen lamp over the conventional filament lamps. (2 marks)
- (b) (i) Define Castor Angle. (1 mark)
- (ii) State the importance of Castor Angle in steering. (1 mark)
- 9 (a) List **two** types of wheels used by heavy commercial vehicles. (1 mark)
- (b) (i) Explain the meaning of backfiring during oxy-acetylene welding. (1 mark)
- (ii) State **two** causes of backfiring during oxy-acetylene welding. (2 marks)
- 10 (a) State **two** desirable characteristics of an effective brake drum. (2 marks)
- (b) Identify **two** forces that acts on a leaf spring due to the action of the driving axles. (2 marks)

SECTION B (60 marks)

*Answer question 11 on A3 paper 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 a block drawn in isometric projection.
- Draw full size in third angle projection the following views:
- (a) sectional front elevation along the cutting plane X-X

(b) sectional end elevation along the cutting plane B-B (15 marks)

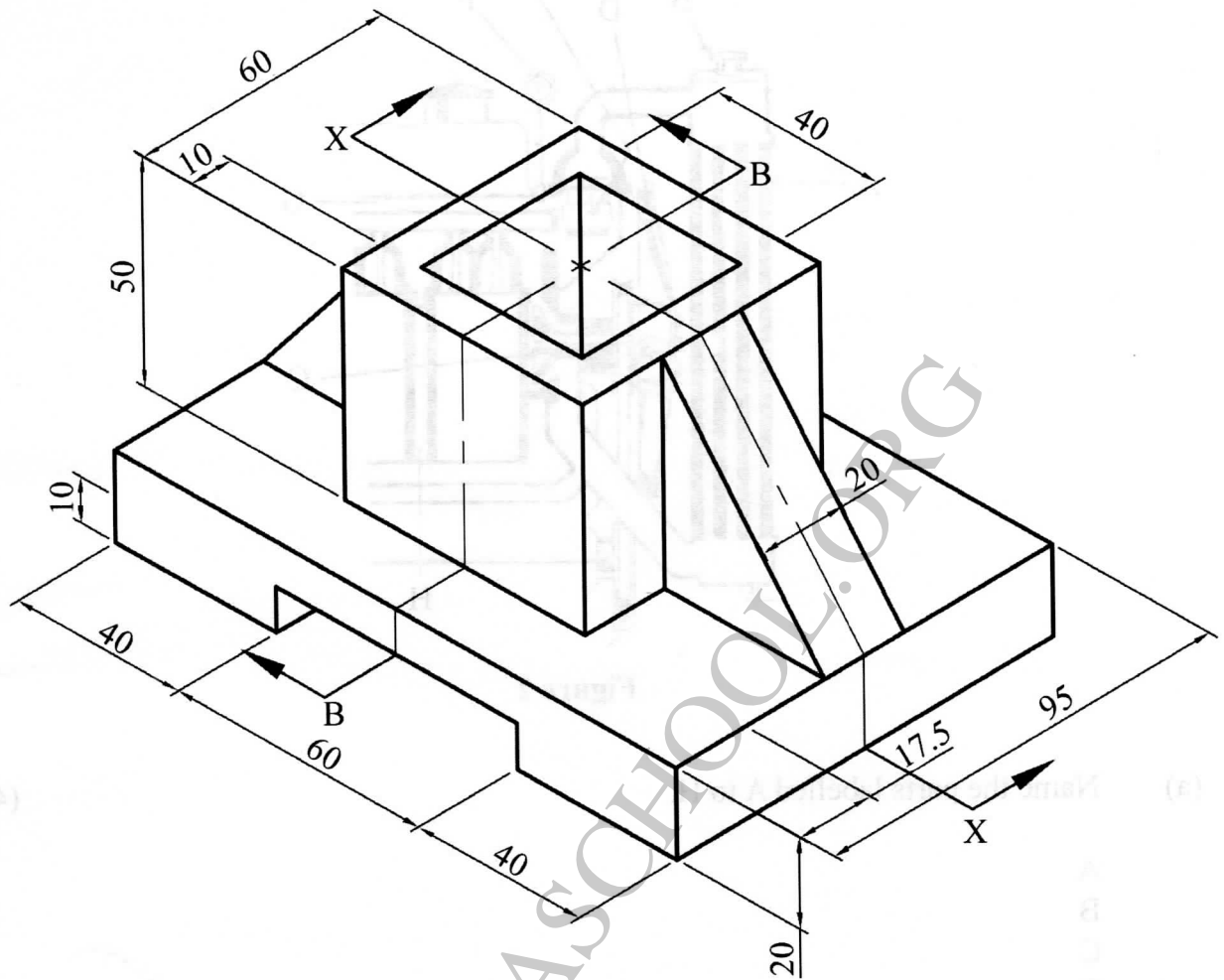


Figure 1

12 Figure 2 shows a typical pressurised water cooling system. (8)

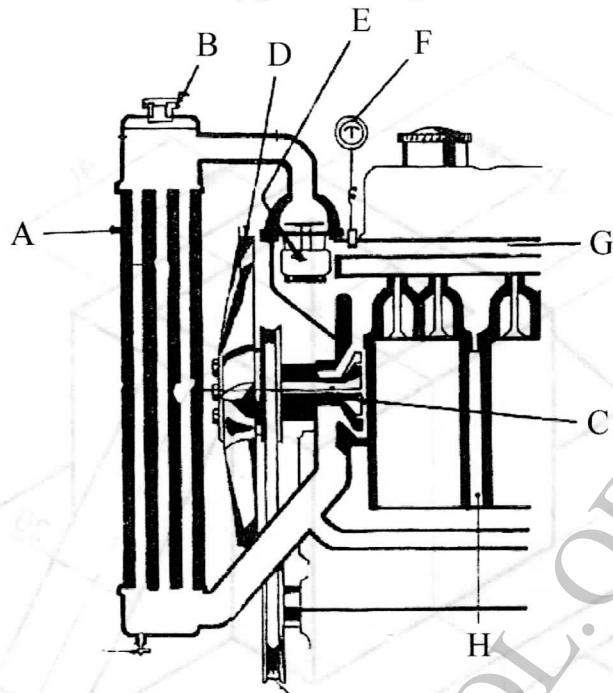


Figure 2

(a) Name the parts labelled A to H. (4 marks)

A
B
C
D
E
F
G
H

(b) Explain how the system works. (11 marks)

13 (a) Outline **three** factors that are used to determine the type of an internal combustion engine. (3 marks)

(b) Explain **six** operational differences between 2-stroke and 4-stroke cycle petrol engines. (12 marks)

14 (a) Name **five** types of non-fusion welding rods and in each case, identify one material they are used to weld in motor vehicles. (5 marks)

(b) With the aid of diagrams illustrate the following types of soldered joints. (6 marks)

(i) lap
(ii) edge
(iii) tee



(c) Explain **two** difficulties experienced when welding cast iron. (4 marks)

15 (a) Identify **four** possible causes of each of the following engine problems. (8 marks)

(i) Engine stalls after idling or slow speed driving.

(ii) Engine backfires

(b) **Figure 3** shows the horn circuit.

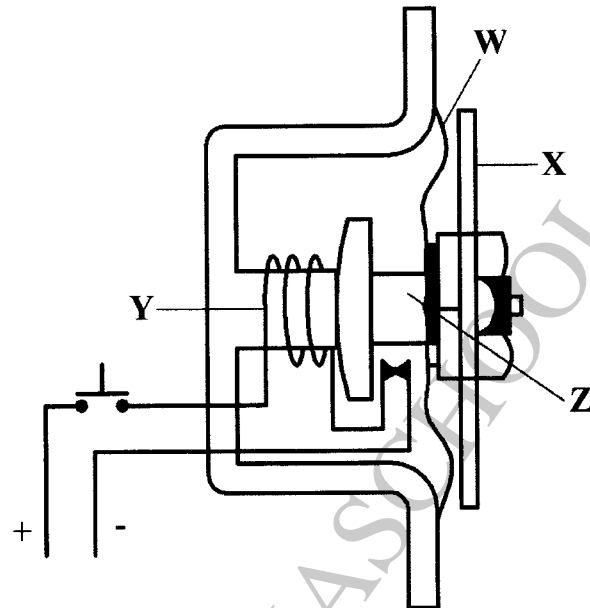


Figure 3

(i) Name the parts labelled W, X, Y and Z (2 marks)

W
X
Y
Z

(ii) Explain how the circuit operates. (5 marks)