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 converters. (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:

(i) Inlet valve lead.

(ii) Exhaust valve lag.

(b) State two advantages of using water as a coolant in multi-cylinder engines.

8 (a) State two advantages of a tungsten halogen lamp over the conventional filament lamps.

(b) (i) Define Castor Angle.

(ii) State the importance of Castor Angle in steering.

9 (a) List two types of wheels used by heavy commercial vehicles.

(b) (i) Explain the meaning of backfiring during oxy-acetylene welding.

(ii) State two causes of backfiring during oxy-acetylene welding.

10 (a) State two desirable characteristics of an effective brake drum.

(b) Identify two forces that acts on a leaf spring due to the action of the driving axles.

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 veiw:

(a) sectional front elevation along the cutting plane X–X
(b) sectional end elevation along the cutting plane B–B

Figure 1
12 **Figure 2** shows a typical pressurised water cooling system.

(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)