

29.18

POWER MECHANICS (447)

29.18.1

Power Mechanics Paper 1 (447/1)



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SECTION A (40 marks)

Answer all the questions in this section.

- 1 (a) Outline the procedure of putting off an electric fire. (2 marks)
- (b) State the minimum requirement for a diploma course in automotive engineering. (1 mark)
- 2 (a) Name four types of files used in a power mechanics workshop. (2 marks)
- (b) Figure 1 shows a hexagonal bolt. Name the parts labelled A, B, C, and D shown in figure 1. (2 marks)

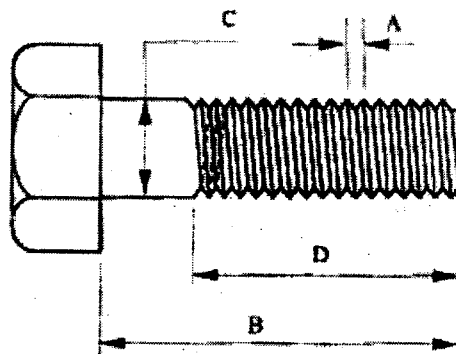


Figure 1

- 3 (a) State two advantages of riveting over soldering. (2 marks)
- (b) Explain the following properties of materials:
 - (i) fusibility;
 - (ii) ductility. (2 marks)
- 4 (a) Calculate the compression ratio of a single cylinder engine having a swept volume of 1600cc and clearance volume of 40cc. (3 marks)
- (b) Outline the procedure of starting a single cylinder petrol engine. (3 marks)
- 5 (a) State two types of bearing loads and for each state an area of application in a motor vehicle. (2 marks)
- (b) State two reasons for using a muffler in a vehicle. (2 marks)
- 6 (a) Name the four main electrical circuits in a motor vehicle. (2 marks)
- (b) Name the two types of stator windings and for each state one area of application. (2 marks)
- 7 (a) Identify three possible causes of low oil pressure in an engine. (3 marks)
- (b) Name four visual checks normally carried out when servicing drum brakes. (2 marks)

- 8 (a) Name **two** types of rims used in each of the following vehicles:
- car;
 - heavy commercial vehicles. (2 marks)
- (b) State the function of each of the following parts of the steering systems:
- gear box;
 - track rod;
 - ball joint. (3 marks)
- 9 State **two** advantages of using aluminium in vehicle body construction. (2 marks)
- 10 Figure 2 shows a diagonal scale of 30mm = 0.5m.

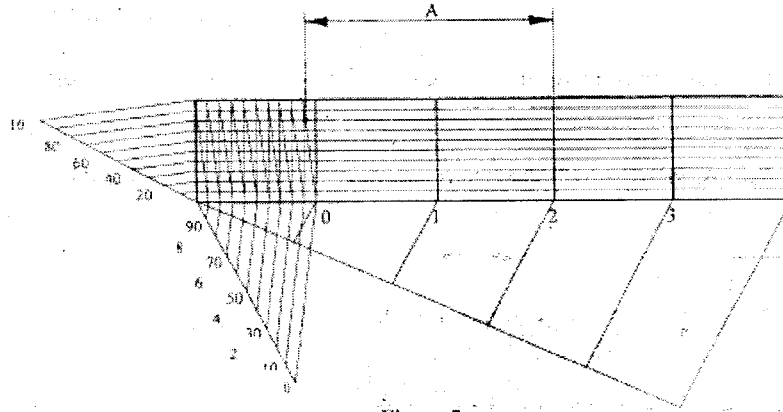


Figure 2

State the following:

- reading A;
- representative fraction for the scale;
- total length of the scale. (3 marks)

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 3 shows **three** orthographic views of an object drawn full size in third angle orthographic projection.

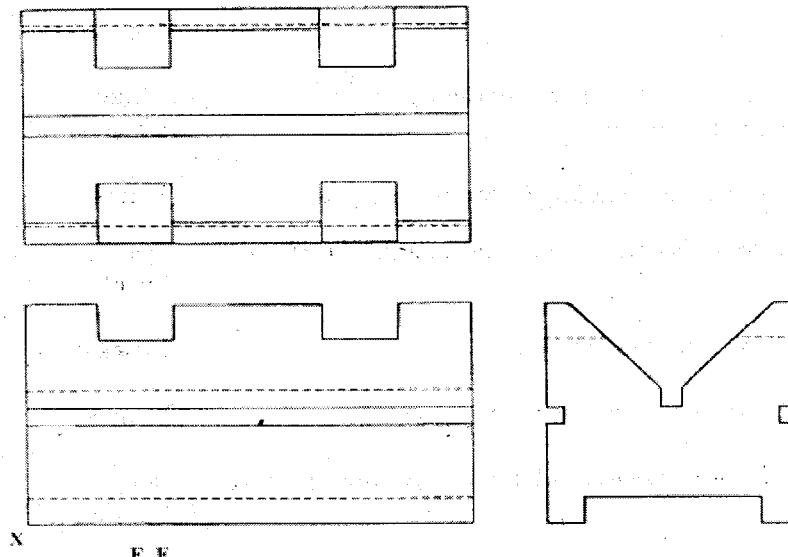


Figure 3

On the grid paper provided in the answer booklet, draw an isometric view of the object taking X as the lowest point. (15 marks)

12 - Figure 4 shows the layout of a vehicle electrical system.

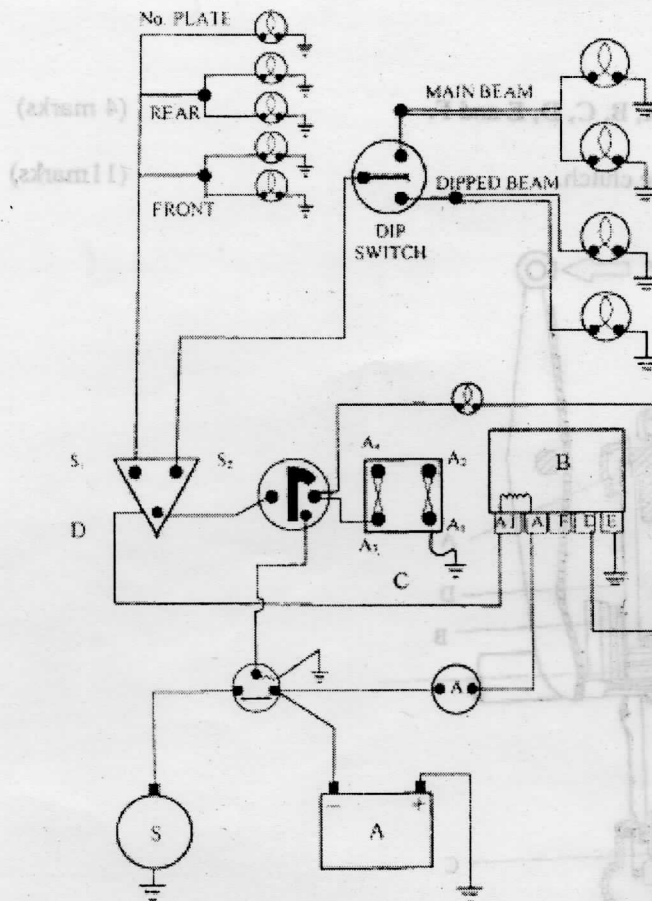


Figure 4 - Lighting Circuits

- (a) Name the parts labelled A, B, C and D. (2 marks)
- (b) State the function of the parts labelled B and C. (2 marks)
- (c) Explain the operation of the lighting circuit. (11 marks)
- 13 (a) Name two types of:
 (i) radiator core;
 (ii) thermostat. (2 marks)
- (b) With the aid of a labeled diagram, explain the operation of a radiator pressure cap. (13 marks)
- 14 Outline the procedure of carrying out each of the following activities and name the tools used in each case:
- (a) checking multicylinder engine cylinder head for warpage; (5 marks)
- (b) measuring cylinder bore taper; (4 marks)
- (c) static timing of the distributor in a spark ignition engine. (6 mark)

15 Figure 5 shows a sectional diagram of a motor vehicle clutch.

- (a) Identify:
- (i) the type of clutch; (4 marks)
 - (ii) the parts labelled A, B, C, D, E and F. (11 marks)
- (b) Explain the operation of the clutch. (11 marks)

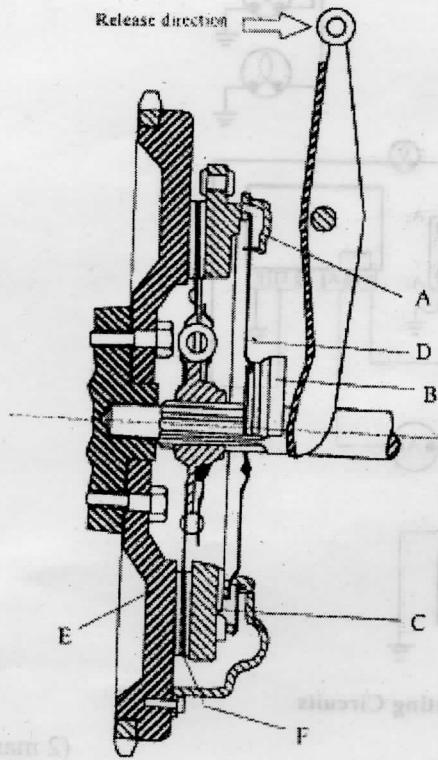


Figure 5

29.18.2

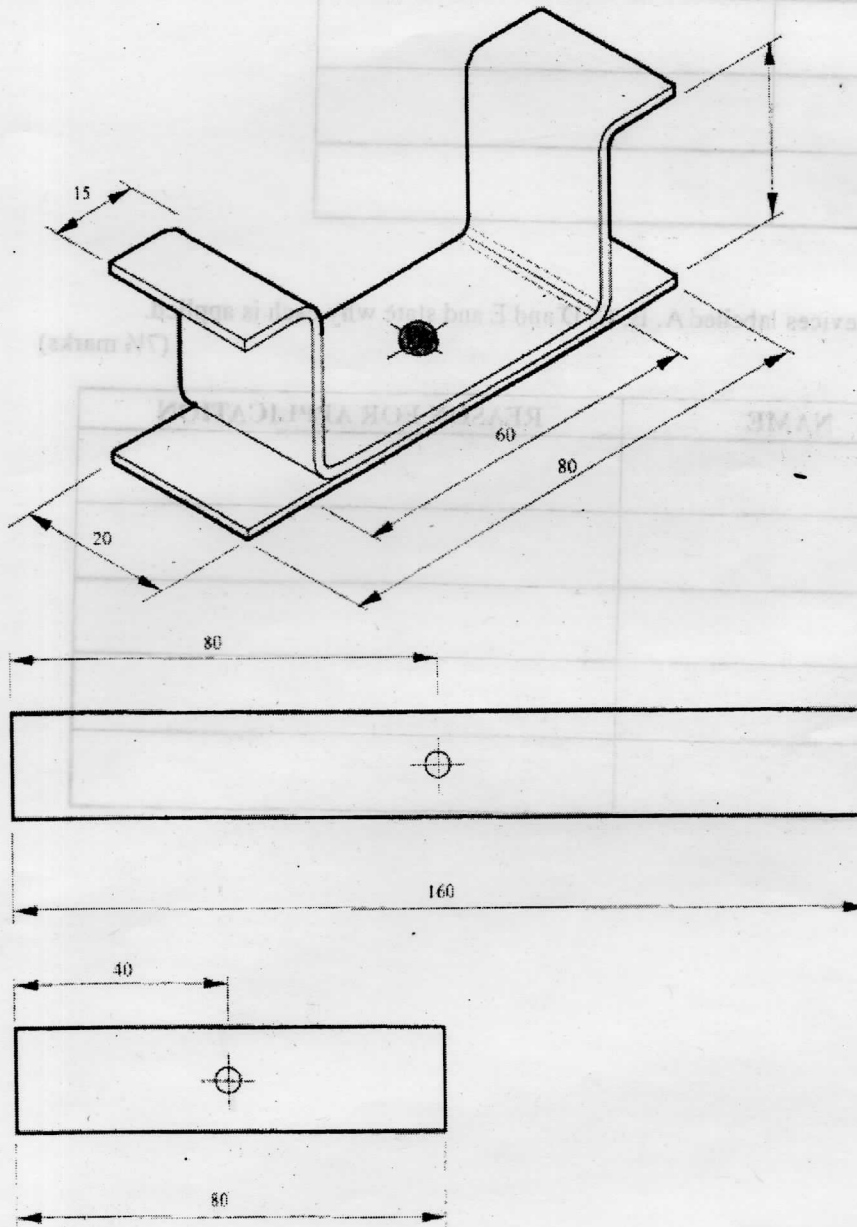
Power Mechanics Paper 2 (447/2)

STATION 1

Sketch a cross-section of a mechanical drum brake assembly and label four parts. (10 marks)

STATION 2

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



STATION 3

- (a) The fluids labelled L, M, N, P and Q are used in a motor vehicle. Identify each of them. (2½ marks)

FLUID	NAME
L	
M	
N	
P	
Q	

- (b) Identify the fastening devices labelled A, B, C, D and E and state why each is applied. (7½ marks)

DEVICE	NAME	REASON FOR APPLICATION
A		
B		
C		
D		
E		

STATION 4

Using the most suitable tool provided, take and record the measurements required. State the accuracy of the tool used and complete the table below.

DESCRIPTION OF REQUIRED MEASUREMENT	MEASUREMENT	TOOL ACCURACY	PART
Crankpin diameter on thrust side			R
Crankpin diameter on non-thrust side			S
Crankpin ovality			T
Circlip internal diameter			U
Piston ring working diameter			V
Piston ring free gap			

(10 marks)

STATION 5

On the single cylinder engine provided:

- Test the sparking plug for operation. (5 marks)
- Carry out the compression test. (5 marks)

Let the examiner check your work.

STATION 6

Using the tools and components provided, connect a simple four-lamp parallel vehicle lighting circuit such that switch S_1 controls two lamps while switch S_2 controls the other two lamps.

Let the examiner check your work. (10 marks)

STATION 7

Replace the cylinder head gasket of the single cylinder engine with the spare one provided.

Let the examiner check your work. (10 marks)

STATION 8

On the single cylinder engine carburettor provided, carry out the following tasks:

- measure and record:
 - float level;

 - float drop.

(5 marks)
- remove the float needle and show it to the examiner. (2 marks)
- assemble the carburettor. (3 marks)

Let the examiner check your work.

STATION 9

Identify the parts labelled R, S, T, U and V and name the vehicle system in which each is used. For each part, identify one defect and state its effect on engine performance. Complete the table below. (10 marks)

PART	NAME	ENGINE SYSTEM	DEFECT	EFFECT
R				
S				
T				
U				
V				

STATION 10

On the multicylinder engine provided carry out the following tasks:

- (a) Check and comment on the oil level. (4 marks)

- (b) Service the air filter. (6 marks)

Let the examiner check your work.