

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Level

GEOMETRICAL AND MECHANICAL DRAWING

9351/02

Paper 2

May/June 2004

3 hours 10 minutes

Additional Materials: A2 Drawing Paper
Standard Drawing Equipment

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name at the bottom right-hand corner of every sheet of paper you use.

You should spend the first ten minutes in reading the whole of the question paper before attempting the questions.

Short concise notes and small, auxiliary sketches may be presented to clarify any design features.

If you use more than one sheet of paper, fasten the sheets together.

Do not use staples, paper clips, highlighters, glue or correction fluid.

The number of marks is given in brackets [] at the end of each question or part question.

Dimensions are given in millimetres; if not given, a reasonable dimension may be assumed.

This document consists of **3** printed pages and **1** blank page and an insert.



INLET VALVE FOR GAS ENGINE

The given drawing shows components of an Inlet Valve for a Gas Engine.

Method of Assembly

The VALVE SPINDLE is lowered into the MAIN CASTING until the valve sits on its seat at **A**.

A COMPRESSION SPRING (not shown) is inserted upwards through the 76 mm diameter hole in the MAIN CASTING and over the stem of the VALVE SPINDLE so that the upper end of the COMPRESSION SPRING is located in the recess **C** of the MAIN CASTING.

The COMPRESSION SPRING:

- has an internal diameter of 50 mm;
- has a compressed length of 176 mm;
- consists of 10 coils;
- is made from 4 mm diameter wire.

The lower end of the COMPRESSION SPRING is retained on the VALVE SPINDLE by the SPRING SEATING (see Design Feature 3), which screws onto the VALVE SPINDLE and slides in the 76 mm diameter bore at **B** in the MAIN CASTING.

The Valve Spindle Assembly is completed by the addition of appropriate LOCKING NUTS (not shown) under the SPRING SEATING.

The COVER PLATE is attached to the top of the MAIN CASTING (see Design Feature 1).

The OUTLET PIPE is attached to the face **D** of the MAIN CASTING (see Design Feature 2).

To complete the required views, a number of design features need to be considered. Modifications and additions will need to be made to the given components and it is essential that the designed items are drawn clearly on the required views. These design features should be supported by annotated sketches, suitably positioned on your answer sheet.

The design features are:

- (i) a method of securing the COVER PLATE to the MAIN CASTING. It should be noted that credit will be given for the size and accurate location of the engineering fixtures used; [3]
- (ii) a method of forming a gas tight joint between the MAIN CASTING and the OUTLET PIPE; [4]
- (iii) suitable machining of the SPRING SEATING which will support and contain the lower end of the COMPRESSION SPRING. [5]

Answer the following questions using either first or third angle orthographic projection.

- 1 Draw, to a scale of 1:2, the following views of the assembled Inlet Valve for a Gas Engine.
 - (a) a half sectional view on the line **GH** with the MAIN CASTING positioned as given in the question paper; [62]
 - (b) the end view taken in the direction of arrow **EV**. [18]
- 2 Draw the symbol of projection used for your answer, in accordance with BS 308 or PP 7308, in the bottom right hand corner of your answer sheet. [2]
- 3 Complete a parts list tabulating all parts complete with suitable materials from which they might be made. [6]

NOTE

- 1 Where a number of similar fixtures are used to join together two components, it is necessary to draw one only, but the positions of the others must be indicated clearly.
- 2 Hidden detail is not required in any view unless it is necessary to amplify a design feature.
- 3 Sizes not shown are left to your discretion.
- 4 Fillet radii should be of appropriate size throughout.

