



ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

TECHNICAL GRAPHICS AND DESIGN
PAPER 2 Mechanical and Building Drawing

6047/2

SPECIMEN PAPER

3 hours 10 minutes

Additional materials:
A2 Drawing paper (2 sheets)

TIME 3 hours 10 minutes

INSTRUCTIONS TO CANDIDATES

Print your name, Centre number and candidate number at the bottom right-hand corner of your answer sheet.

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

There are **two** questions from building drawing and **two** questions from mechanical drawing. Answer **any one** question on the separate drawing paper provided.

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

Measurements **not** given are left to your own discretion. Work out all your answers in **SI** units.

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

INFORMATION FOR CANDIDATES

Marks are given in brackets [] at the end of each question or part question.

The diagrams are **not** necessarily drawn to scale.

All dimensions are in **millimetres** unless otherwise stated.

You are reminded of the need for good English and clear presentation in your answers.

This question paper consists of 11 printed pages, 1 blank page.

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Question 1

The components of a **Safety Valve** are shown in **third angle** projection.

Method of Assembly

Valve (5) is slid into the **valve seat (6)** from the flange side. The sub-assembly is inserted into the **body (1)** such that the valve seat flange is in contact with the body. The **valve stem (9)** is lowered into the body until the rounded end sits on the valve.

Next, the **packing (8)** is inserted into the **cover (2)**. The **gland (7)** is then used to keep the packing in place. The gland is held in position by **two M16 studs (14)**. The sub-assembly is slid over the valve stem, such that the cover is fastened to the body by **6 adjusting screws (13)**. **2 M20 threaded rods (10)** are then screwed into the cover.

Spring holders (12) are placed on either end of the **spring (4)**. The sub-assembly is placed such that the dog end of the stem end gets into the lower spring holder. The **bridge plate (3)** is pushed over the threaded rod, and then the **hexagon adjusting screw (11)** is screwed into the bridge plate so that its dog end gets into the upper spring holder.

To complete this assembly the following design features are required:

- (i) a method of sealing between the cover and the body, [2]
- (ii) a means of locking the adjusting screw in a desired position, [4]
- (iii) a method of hand operating the adjusting screw, [4]
- (iv) a means of keeping the plate in position. [2]

Draw to a scale of **1:2** either in **first** or **third angle** projection, the following views of the complete assembly:

- (a) a sectional elevation along the cutting plane **X-X**, as shown on the body, [52]
- (b) in projection with view (a), a plan, [17]
- (c) an outside end view in the direction of arrow **Y**. [19]

NB. Do **not** show hidden details.

Chamfers, small radii and dimensions **not** shown are left to your discretion.

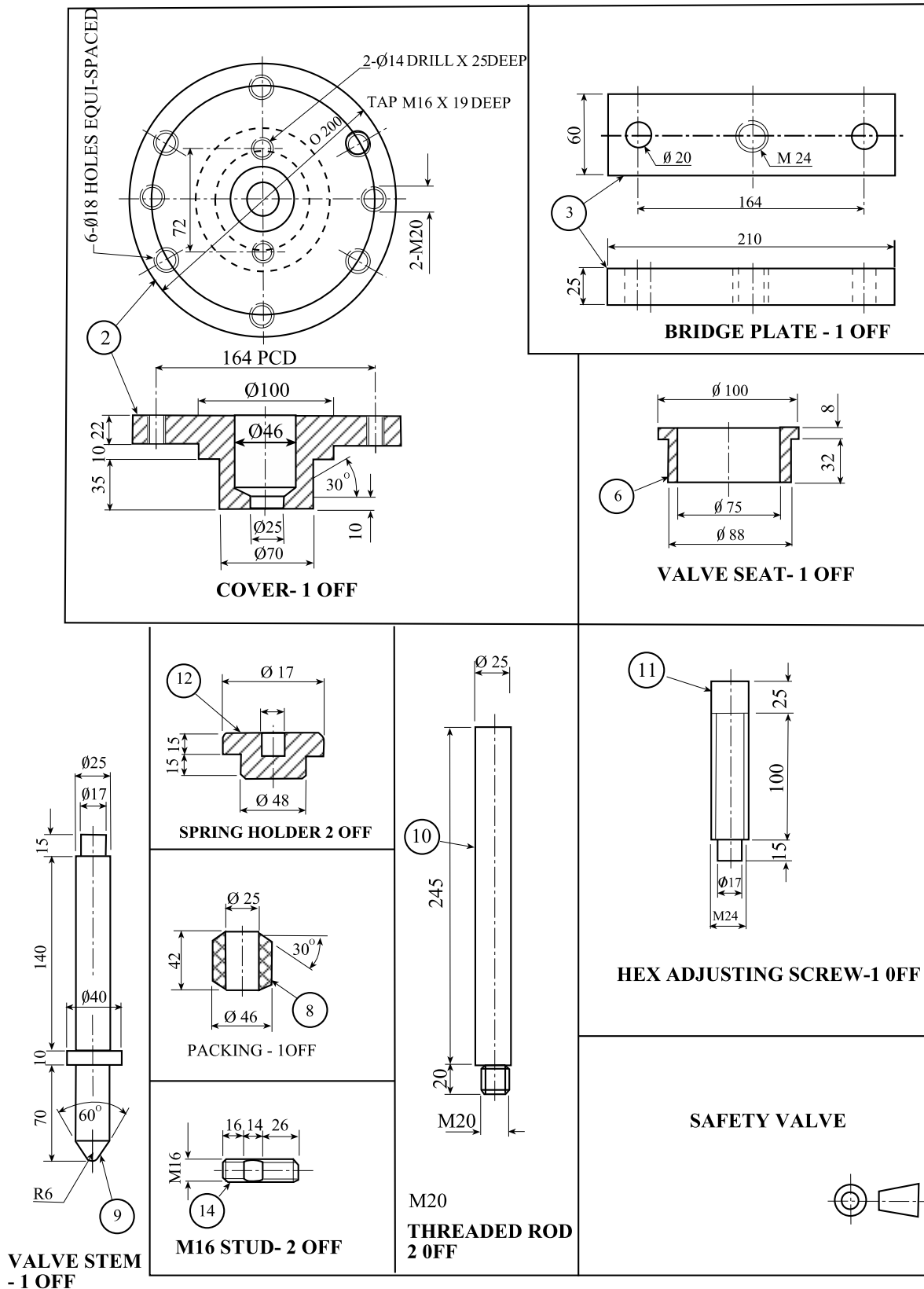


Fig.1 (a)

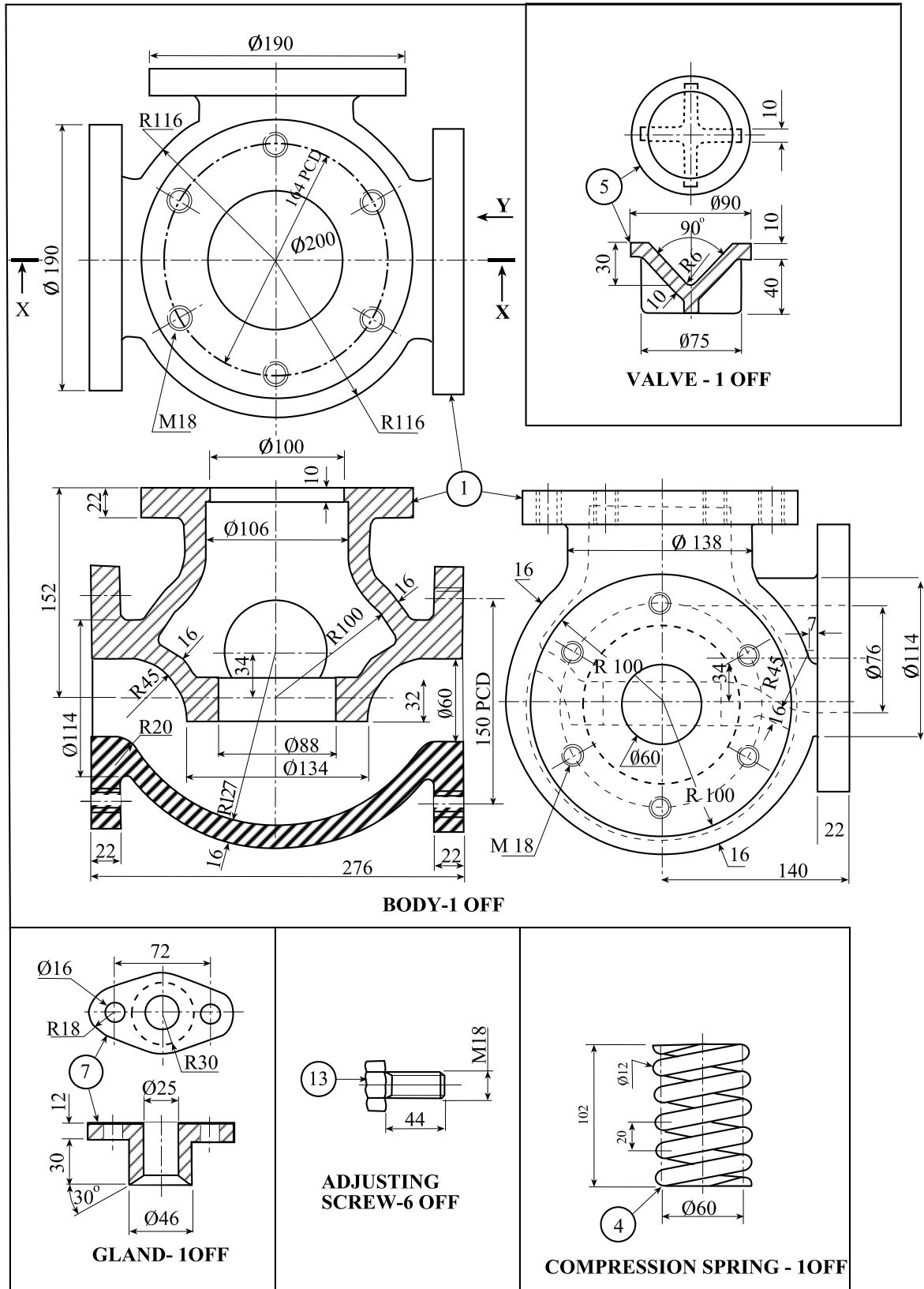


Fig.1 (b)

Question 2

Details of components for a **WORM GEAR** are shown on **Fig 2(a)** and **2(b)**.

METHOD OF ASSEMBLY

The **thrust race (7)** is slid over the shorter end shaft of the **worm (6)**. The **bush (8)** is also slid over the same shaft end of the worm to hold the thrust race bearing firm against the worm. This sub-assembly is fed into the **casting (1)** from the left. The **bush (9)** is inserted into the **end cover (13)** from the **Ø58** boss. The sub-assembly is mounted onto the longer end shaft of the worm and secured to the casting by six **M6** studs and nuts (not shown). The **bushes (4)** and **(5)** are inserted into the **Ø28** holes in the casting. The **shaft (3)** is then pushed through these bushes and through the **wormwheel (2)**. The **end plates (10)** and **(11)** are then secured onto the casting by **four M6** hexagonal headed set screws (not shown). Finally, the **cover plate (12)** is secured onto the casting by **eight M6** hexagonal headed set screws (not shown).

- (a) To complete the assembly, certain design features need to be considered and drawn in on the required views. Where necessary minor modifications may be made to the given components and any extra components added to complete the design requirements.

The design features are:

- | | | |
|--|---|------|
| (i) | a means of transmitting positive drive between the shaft (3) and the wormwheel (2) , | [2] |
| (ii) | a means of preventing leakage along the shaft (3) , | [2] |
| (iii) | a pulley to transmit positive drive to the worm (6) , | [4] |
| (iv) | a method of lubricating the bearing. | [4] |
|
(b) Draw full size , in either first or third angle projection: | | |
| (i) | a sectional elevation AA . Show worm (6) and wormwheel (2) in mesh. | [60] |
| (ii) | an end view seen in the direction of arrow Y . Show a part section of the mesh between the worm and wormwheel. | [26] |
| (c) | Show the symbol of projection used. | [2] |

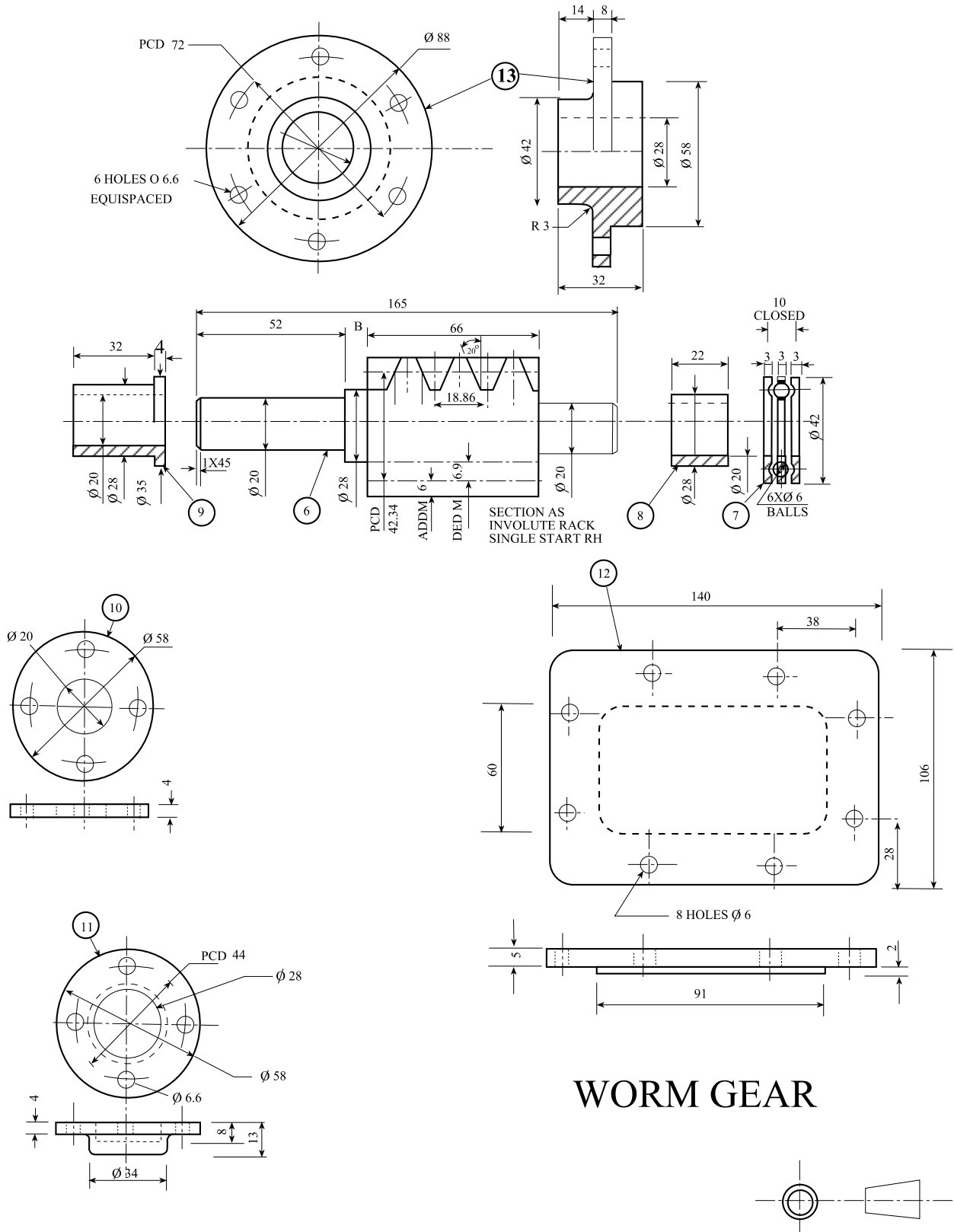


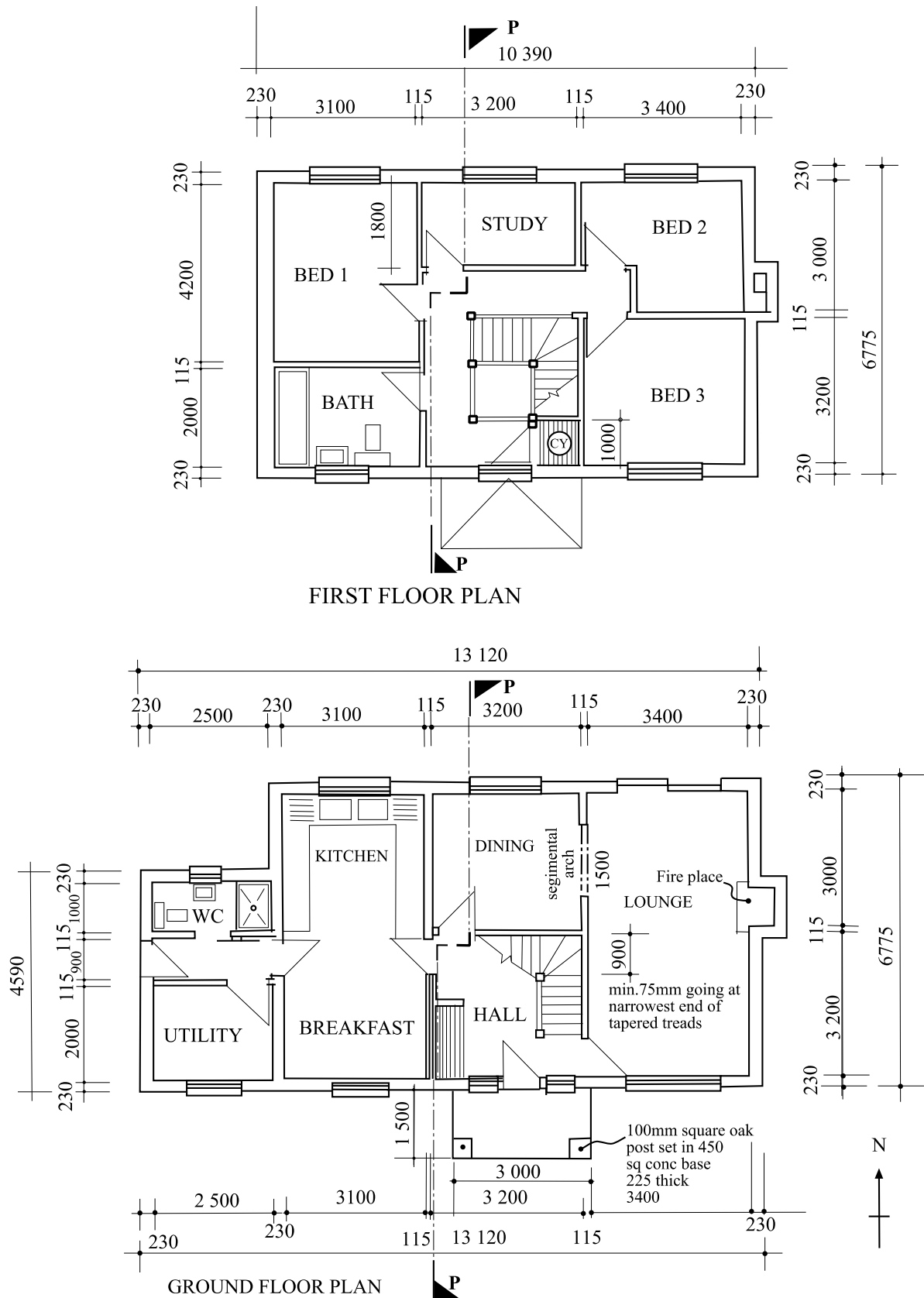
Fig. 2(a)

Question 3

The diagram of a complete ground floor and a **first** floor plan of a **two** storey house are given in **Figure 3**.

To complete the **first** floor and elevations, a number of design features are required. If necessary, minor modifications may be made to the given floor drawings. Any additional details must be drawn in.

- (i) 5 bedrooms of which the main bedroom is en-suite,
- (ii) bathrooms and toilets,
- (iii) guest room with bathroom and toilet, to be located above the garage,
- (iv) balcony,
- (v) suitable roof,
- (vi) suitable openings.



Draw to scale **1:100** the following views of the complete building, with the design features incorporated:

- (a) the given ground floor, [19]
- (b) the first floor plan, [30]
- (c) sectional elevation, through cutting plane **P-P**, [27]
- (d) South elevation, [12]
- (e) East elevation. [12]

Question 4

A complete **ground floor plan**, an outline of the **first floor plan** and a **side elevation** of a **family house** built on a slopping area are given in **figure 4**.

To complete the design, the following room layout needs to be considered on the **first floor**:

- (i) 2 bedrooms,
- (ii) dress area and bathroom,
- (iii) built in cupboards.

Minor alterations, additions or extensions may be considered in the design layout.

With the layout of the design complete,

draw to a scale **1:100** the following views of the house:

- (a) the ground floor plan, [15]
- (b) the **first floor plan**, [25]
- (c) the sectional elevation through cutting plane **Y-Y**, [40]
- (d) the elevation as seen from the entrance hall side. [10]

Design and draw a suitable septic tank and soakaway for the house. [10]

- All drawings should comply with the model building by-laws.
- All window and door openings refer to the schedule provided.
- Ignore the cavity in the walls of the given views.

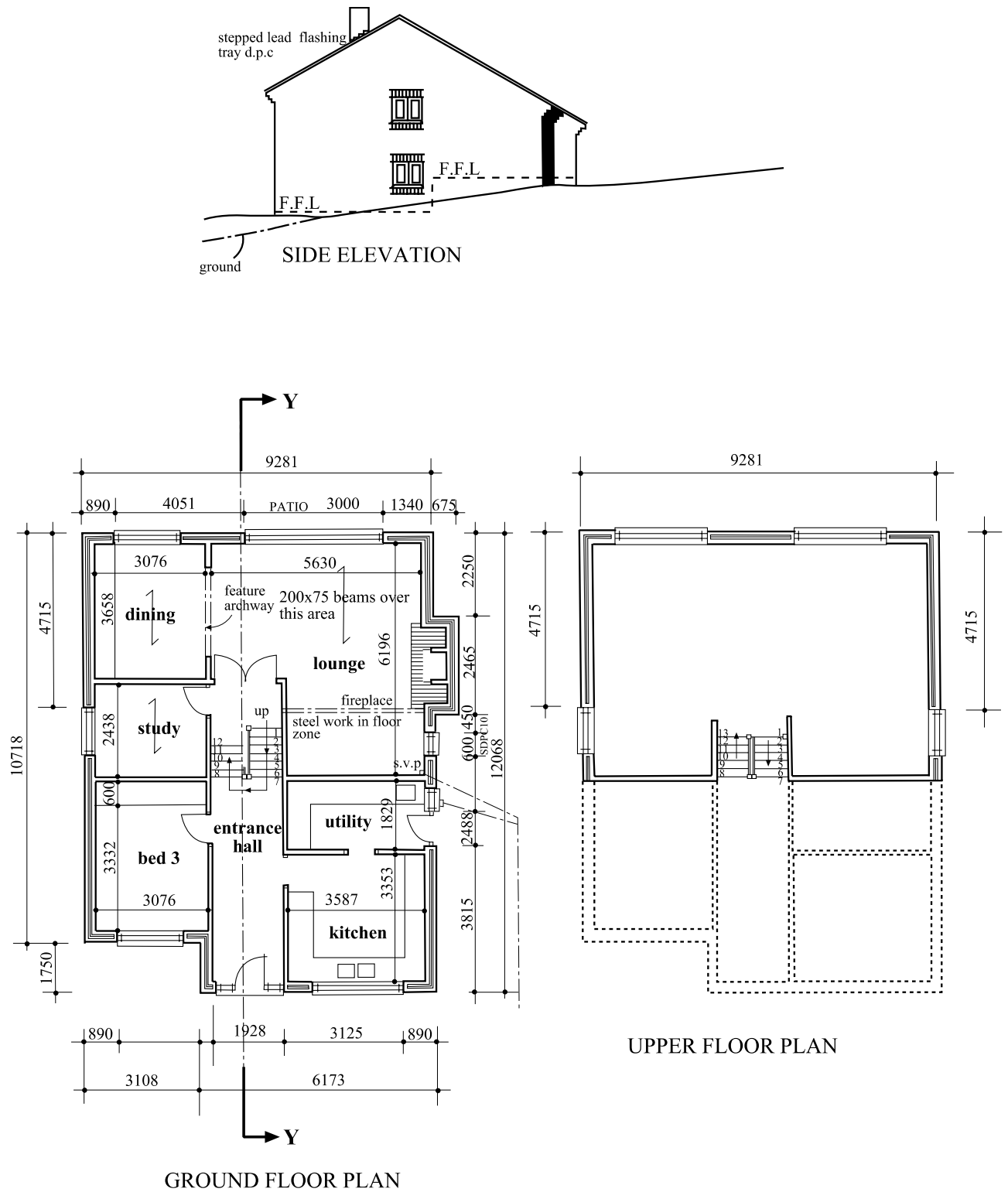


Fig.4

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