

### 3.17 METALWORK (445)

#### 3.17.1 Metalwork Paper 1 (445/1)

#### SECTION A (40 marks)

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

- 1 (a) Name **four** career training programmes in metalwork. (2 marks)
- (b) Define the term “self employment”. (1 mark)
- 2 (a) Name **three** types of cold chisels and give **one** use of each. (3 marks)
- (b) List **six** operations that can be performed on a drilling machine. (3 marks)
- 3 (a) Give **two** reasons in each case why the following should be avoided in the workshop:
- (i) long hair;
- (ii) long nails. (2 marks)
- (b) State **four** factors to consider in order to obtain strong brazed joints. (2 marks)
- 4 (a) State the use of the following instruments:
- (i) vernier protractor;
- (ii) vernier height gauge. (2 marks)
- (b) State the function of the following parts of a micrometer screw gauge:
- (i) ratchet;
- (ii) spindle. (1 mark)
- 5 Define the following properties of metals giving **one** example of a metal with the property:
- (a) malleability;
- (b) toughness;
- (c) plasticity. (3 marks)
- 6 (a) State **three** advantages of oxy-acetylene welding over other methods of welding. (3 marks)
- (b) Give **two** reasons for rounding off the tip of a lathe cutting tool bit. (1 mark)

- 7 (a) With the aid of a labelled sketch, illustrate the hollowing process. (4 marks)
- (b) State the use of marking agents and name any **two**. (2 marks)
- 8 (a) List **three** tempering techniques used in heat treatment. ( $1\frac{1}{2}$  marks)
- (b) Define the term “point of recalescence” as used in heat treatment. ( $1\frac{1}{2}$  marks)
- 9 (a) The diameter of a snap head rivet is 4 mm. Determine the projection allowance required to form the head when riveting. (1 mark)
- (b) State the defects caused by each of the following in riveting:
- (i) failure to use a rivet set;
- (ii) too much rivet shank projecting. (2 marks)
- 10 (a) Outline the procedure of bluing as a metal finishing process. (2 marks)
- (b) Use sketches to illustrate upsetting as a forging process. (3 marks)

SECTION B (60 marks)

Answer **question 11** on the A3 paper provided 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 an isometric drawing of a block.

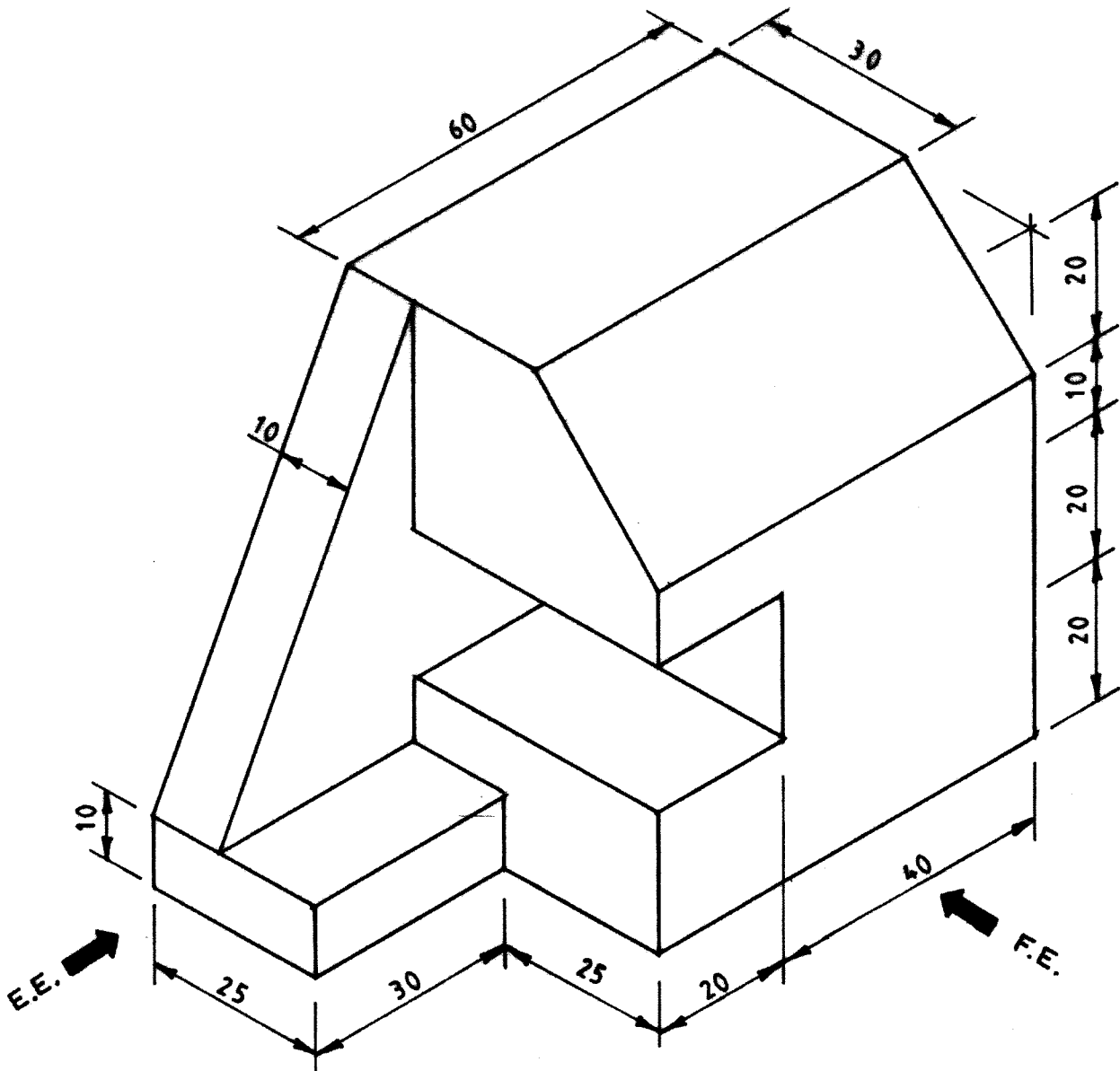


Fig. 1

Draw the following views **full size** in first angle projection:

- front elevation in the direction of arrow F.E;
- end elevation in the direction of arrow E.E;
- the plan.

(15 marks)

12 **Figure 2** shows a drawing of a bench drilling machine.

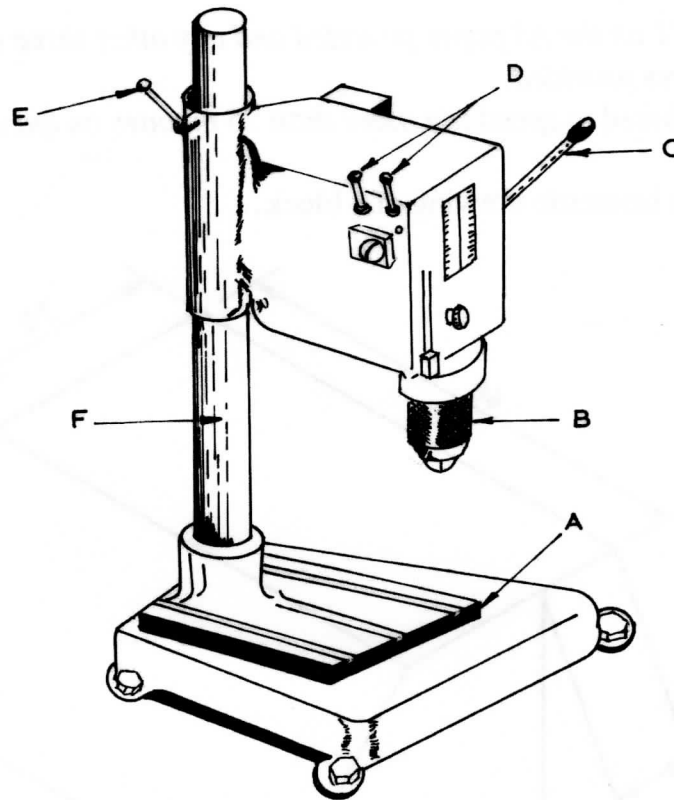


Fig. 2

- (a) Name the parts labelled A, B, C, D, E, F and state **one** function of each. (6 marks)
- (b) Outline **three** safety precautions to observe when using the machine. (3 marks)
- (c) Explain the relationship between the following:
  - (i) speed and feed;
  - (ii) speed and drill diameter;
  - (iii) feed and material. (6 marks)

13 **Figure 3** shows a working drawing of a spanner to be made from a mild steel plate  $122 \times 42 \times 4$ mm .

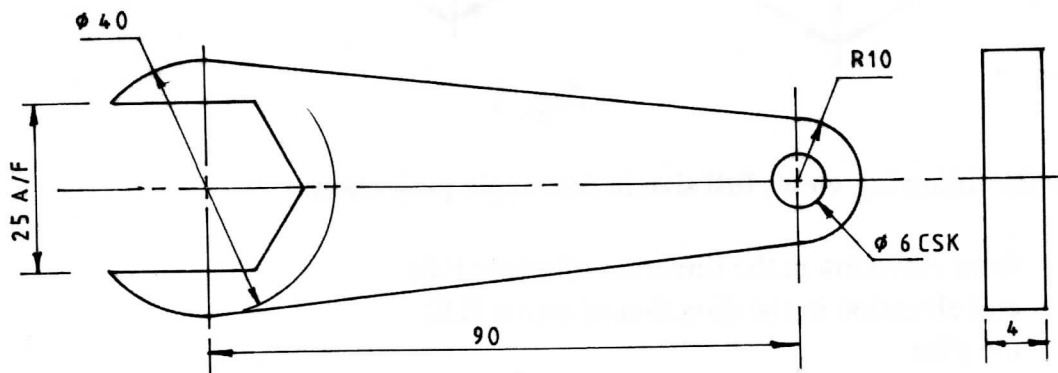


Fig. 3

Outline the procedure of:

- (a) marking the size of spanner; (8 marks)
- (b) making the spanner; (5 marks)
- (c) case hardening the spanner. (2 marks)

14 Figure 4 shows a component to be produced on a lathe machine.

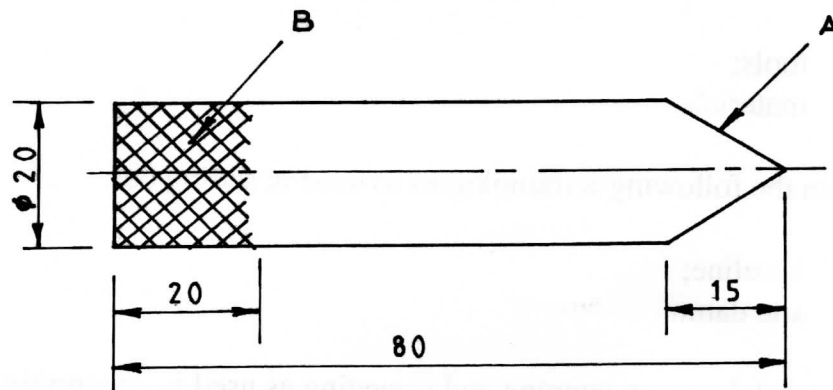


Fig. 4

- (a) Identify the details at:
    - (i) point A;
    - (ii) point B. (1 mark)
  - (b) Use labelled sketches to show the set up of the workpiece on the lathe machine to produce:
    - (i) detail A; (7 marks)
    - (ii) detail B. (7 marks)
- 15 (a) With the aid of sketches, distinguish between square and round hollow tongs. (5 marks)
- (b) State **four** uses of a swage block. (2 marks)
  - (c) With reference to brazing, outline the procedure of:
    - (i) lighting the blow pipe; (5 marks)
    - (ii) shutting down the equipment. (3 marks)