SECTION A: MATERIAL PROCESSES AND WORKSHOP TECHNOLOGY
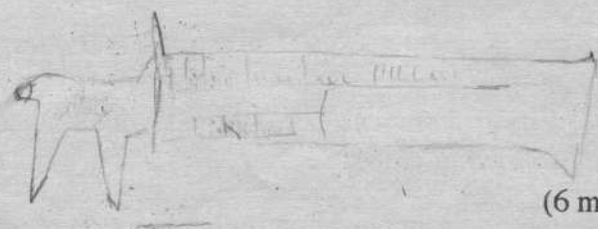
Answer any THREE questions from this section.

1. (a) Explain the following properties of engineering materials:

   (i) hardness;

   (ii) malleability. (4 marks)

   (b) (i) State **two** reasons why 'finishing' is done on an engineering product.

   (ii) Distinguish between lacquering and enamelling finishing processes. (6 marks)

   (c) Describe the **two** techniques of filling. (4 marks)

   (d) Draw a labelled diagram showing the extraction of aluminium by electrolysis.

   (6 marks)

2. (a) State **two**:

   (i) (I) reasons for the formulation of IEE regulations;

   (II) conditions upon which a person can get an electric shock.

   (4 marks)

   (ii) List **four** obligations on an employer at a work place as stipulated in the Safety and Health Act. (4 marks)

   (b) Outline **two** reasons for using a cutting fluid with high speed tools. (2 marks)

   (c) Describe the functions of the following lathe machine parts:

   (i) bed;

   (ii) headstock. (4 marks)

   (d) Sketch the following 'left hand' lathe machine cutting tools:

   (i) facing;

   (ii) roughing;

   (iii) finishing. (6 marks)

3. (a) Define the term 'tolerance' with reference to workshop measurements. (1 mark)

(b) State **three**:

(i) categories of fits;

(ii) functions of a steel rule. (6 marks)

(c) Draw a labelled diagram of a vernier callipers. (8 marks)

(d) Outline:

(i) **two** factors considered when selecting a hacksaw blade;

(ii) **three** safety precautions observed when cutting a work piece using a hacksaw blade. (5 marks)

4. (a) Describe the following metal joining processes:

(i) riveting;

(ii) bolting. (4 marks)

(b) Distinguish between 'soft soldering' and 'brazing'. (4 marks)

(c) Sketch the following self secured joints used in sheet metal:

(i) 'paned down' bottom joint;

(ii) slip joint;

(iii) grooved seam. (6 marks)

(d) (i) List **two** machines used in sheet metal fabrication.

(ii) Outline **four** safety precautions observed when sharpening cutting tools on a grinding wheel. (6 marks)

SECTION B: ENGINEERING DRAWING

*Answer **TWO** questions from this section.*

5. **Figure 1** shows a pictorial view of an object. Draw, full size in first angle projection, the following views:

(i)   front elevation in the direction of arrow A;

(ii)   end elevation in the direction of arrow B;

(iii)   plan in the direction of arrow P.

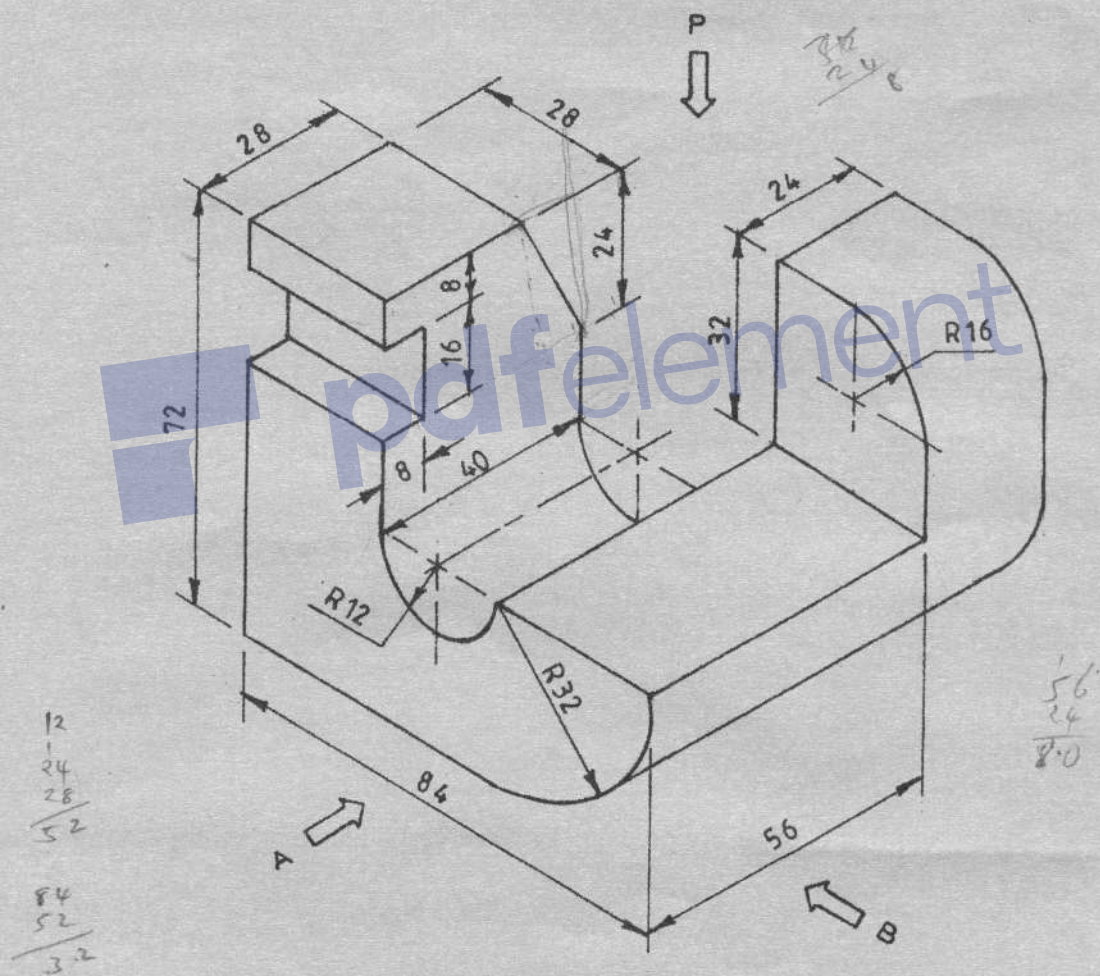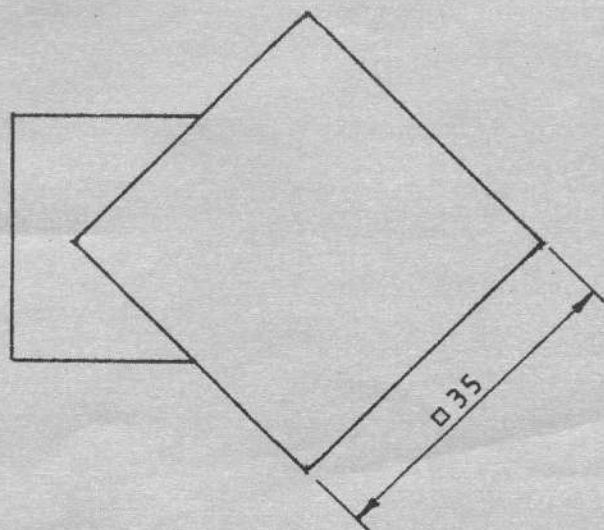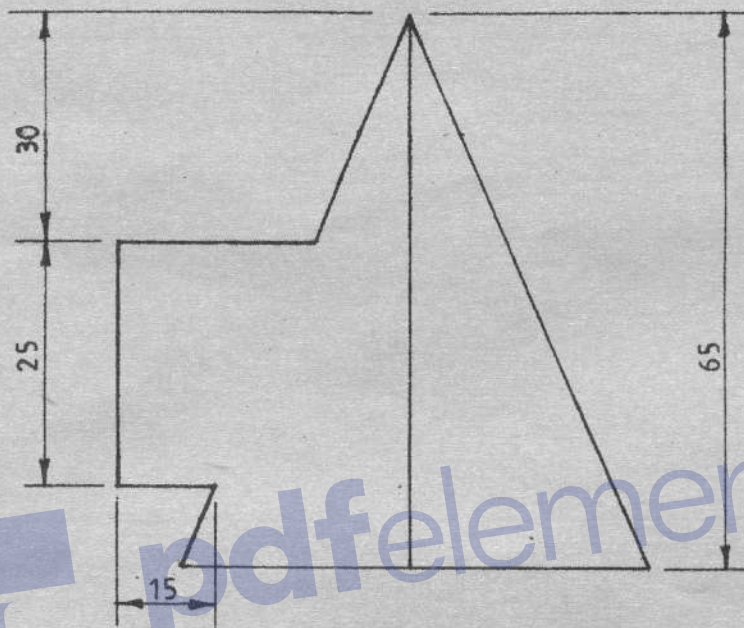Insert **six** major dimensions.   (20 marks)

Fig. 1

6. **Figure 2** shows the intersection of a square prism and a square base pyramid. Re-draw the given views and draw the following:

    (i)   line of intersection;

    (ii) complete plan;

    (iii) end elevation;

    (iv) development of the pyramid.   (20 marks)

Fig. 2

7. (a) **Figure 3** shows a link AB pin-jointed at end A. End B is constrained to slide along the path XY. Draw the locus of the midpoint M for one revolution of the crank.
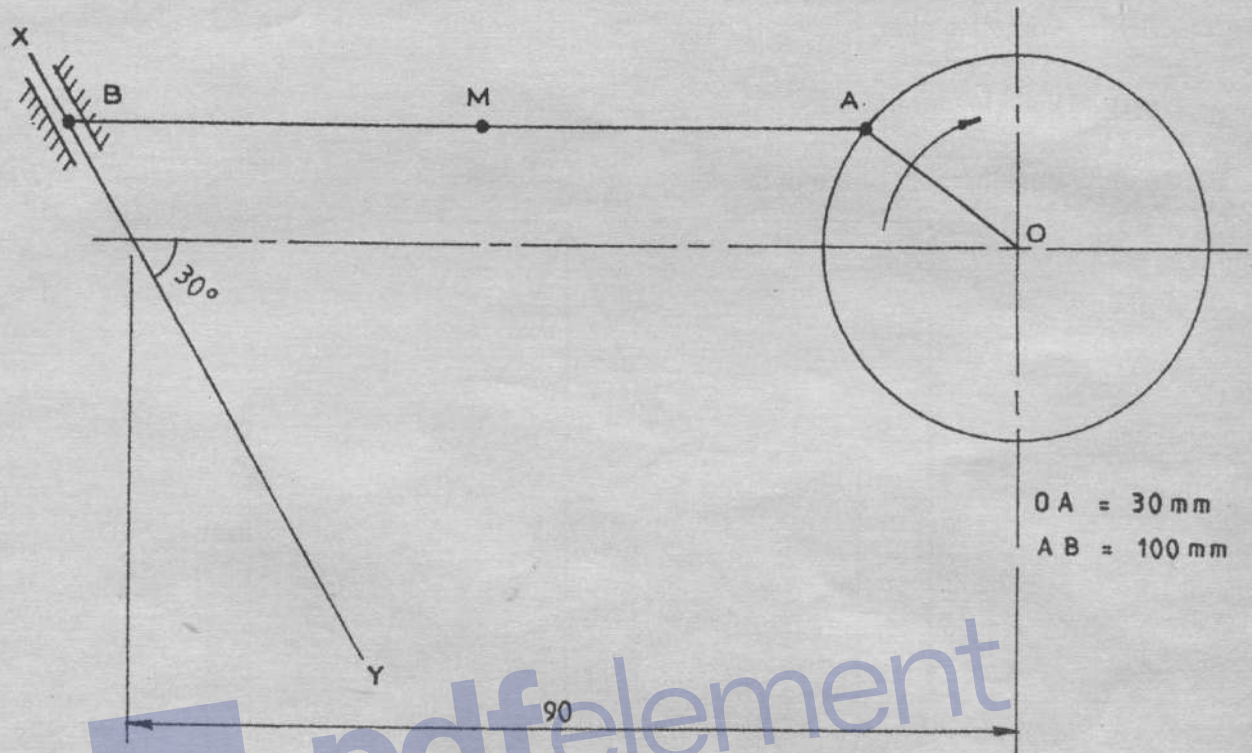
(15 marks)

OA = 30 mm
AB = 100 mm

Fig. 3

(b) Construct a hexagon, using a pair of compasses and a ruler only, in a circle of diameter 80 mm. (5 marks)

8. (a) Sketch the following hand tools:

(i) ball pein hammer;

(ii) flat screw driver. (4 marks)

(b)   **Figure 4** shows two views of a solid drawn in 3rd angle projection. Draw an isometric
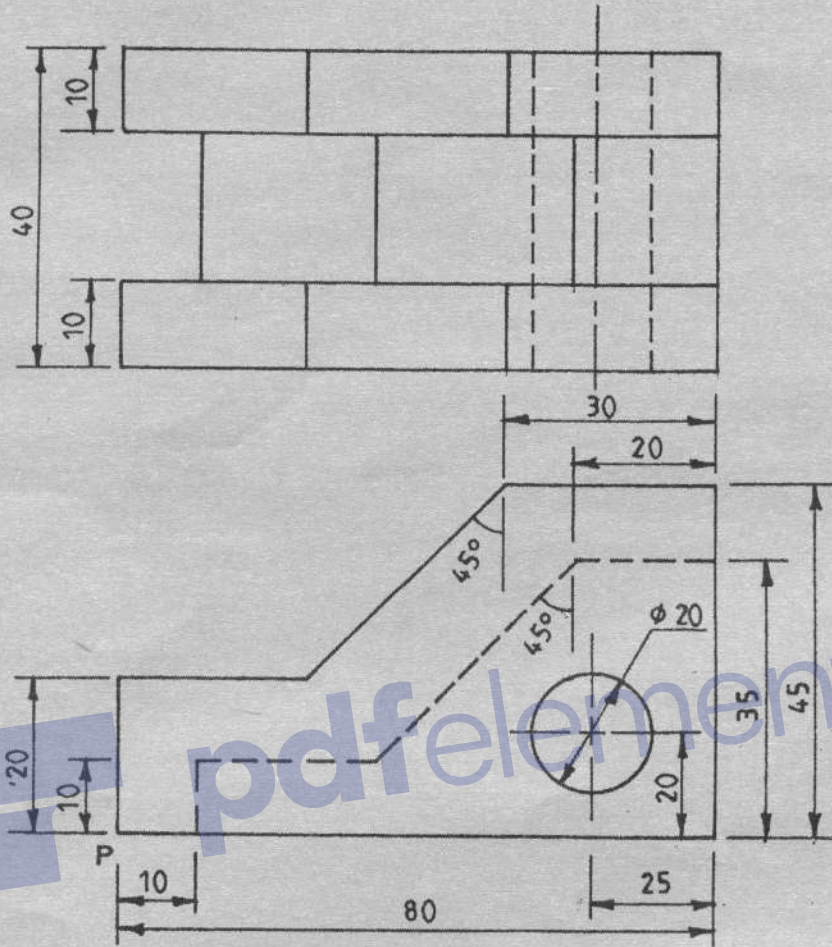view of the object taking corner P as the lowest point.   (16 marks)

Fig. 4

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