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ENGINEERING DRAWING, MATERIALS,
PROCESSES AND WORKSHOP TECHNOLOGY

June/July 2019

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING
(POWER OPTION)
(TELECOMMUNICATION OPTION)
(INSTRUMENTATION OPTION)

MODULE I

ENGINEERING DRAWING, MATERIALS, PROCESSES AND WORKSHOP TECHNOLOGY

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3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instruments;

Mathematical tables/ Scientific calculator;

Drawing paper A3.

This paper consists of EIGHT questions in TWO sections: A and B.

Answer THREE questions from section A and TWO questions from section B in the answer booklet provided.

Maximum marks for each part of a question are as indicated.

Candidates should answer the questions in English.

This paper consists of 7 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A: MATERIALS, PROCESSES AND WORKSHOP TECHNOLOGY

Answer **THREE** questions from this section.

1. (a) List **four** safety measures observed in a mechanical workshop. (4 marks)
- (b) Explain the following metal finishing processes:
- (i) enameling;
 - (ii) electroplating. (4 marks)
- (c) (i) State **four** properties of engineering materials.
- (ii) Distinguish between non-metals and alloys, giving **one** example of each. (8 marks)
- (d) Sketch part of a micrometer to show a reading of 5.54 mm. (4 marks)
2. (a) With the aid of sketches, describe the following workshop tools and state **one** application of each:
- (i) scribe;
 - (ii) centre punch. (8 marks)
- (b) With the aid of a sketch, explain the following sheet metal joints:
- (i) folded seam;
 - (ii) grooved seam. (8 marks)
- (c) Name **four** weld defects and **one** cause for each defect. (4 marks)
3. (a) Sketch the following mechanical fasteners and state their application:
- (i) lock nut;
 - (ii) pan head screw. (6 marks)
- (b) (i) Define the term 'soldering'.
- (ii) Outline **four** differences between soldering and brazing. (10 marks)

(c) Describe the following parts of a shaping machine and state **one** function for each.

(i) column;

(ii) ram.

(4 marks)

4. (a) Explain the function of the following lathe machine components:

(i) tailstock;

(ii) headstock.

(4 marks)

(b) Explain the following lathe machine operations:

(i) turning;

(ii) drilling.

(4 marks)

(c) List **two** types of grinding machines commonly used in a workshop.

(2 marks)

(d) **Figure 1** shows a bench drilling machine. Name and state the functions of the parts labelled A - E.

(10 marks)

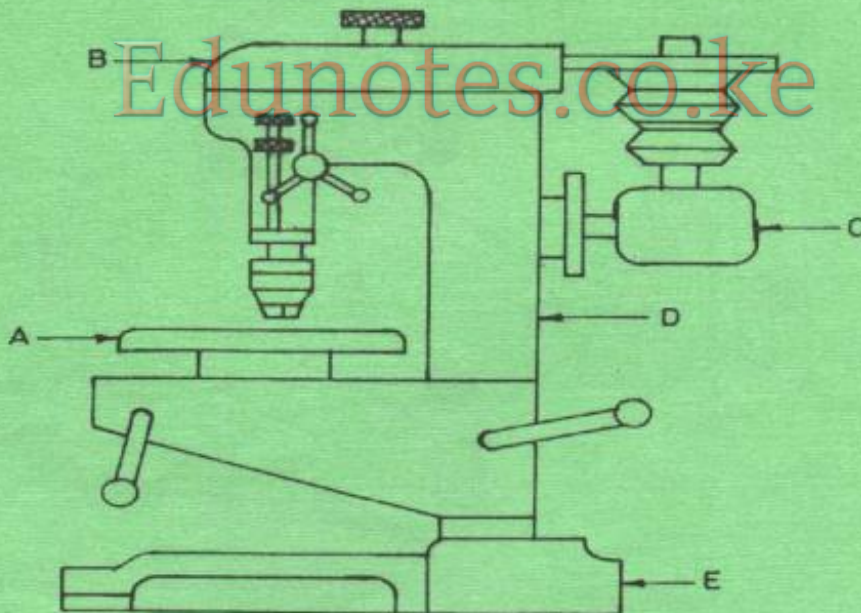


Fig.1

SECTION B: ENGINEERING DRAWING

Answer TWO questions from this section.

5. Figure 2 shows a machined block. Draw in third angle projection, showing hidden details, the following views:

- (a) the plan in the direction of arrow P;
- (b) front elevation in the direction of arrow F;
- (c) end elevation in the direction of arrow E.

Insert six dimensions.

(20 marks)

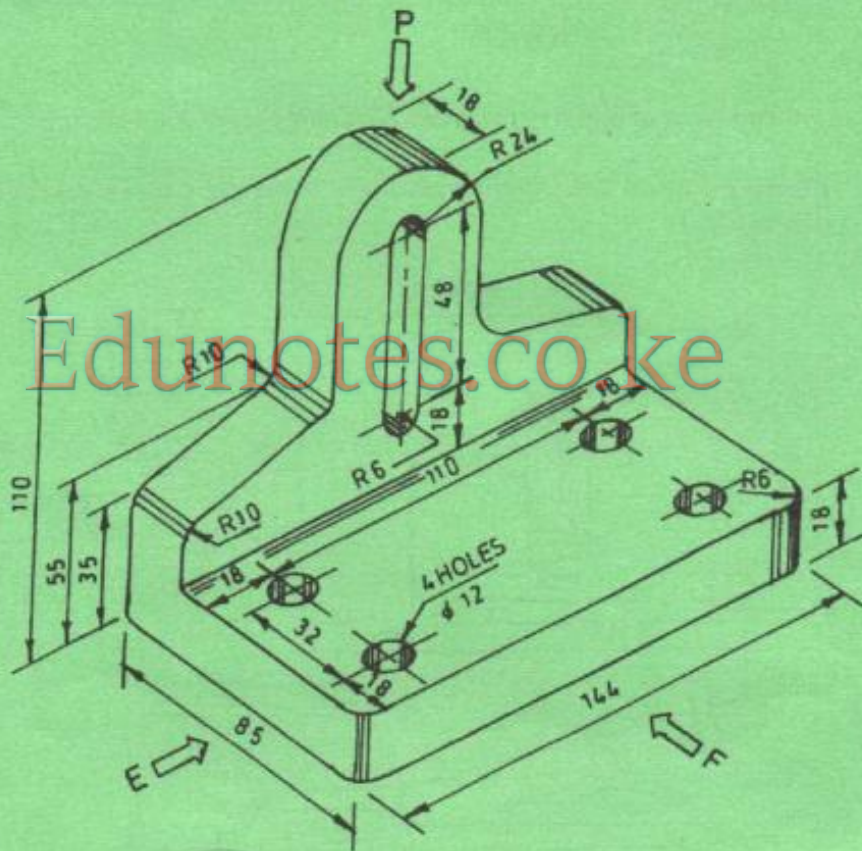
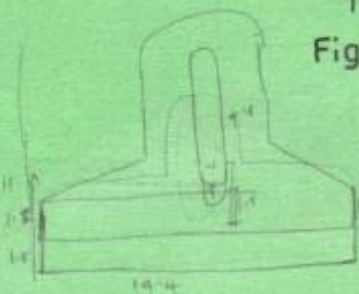
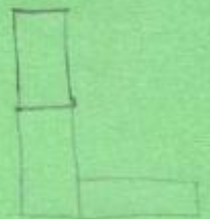
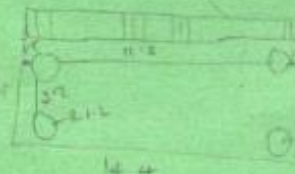


Fig. 2



4



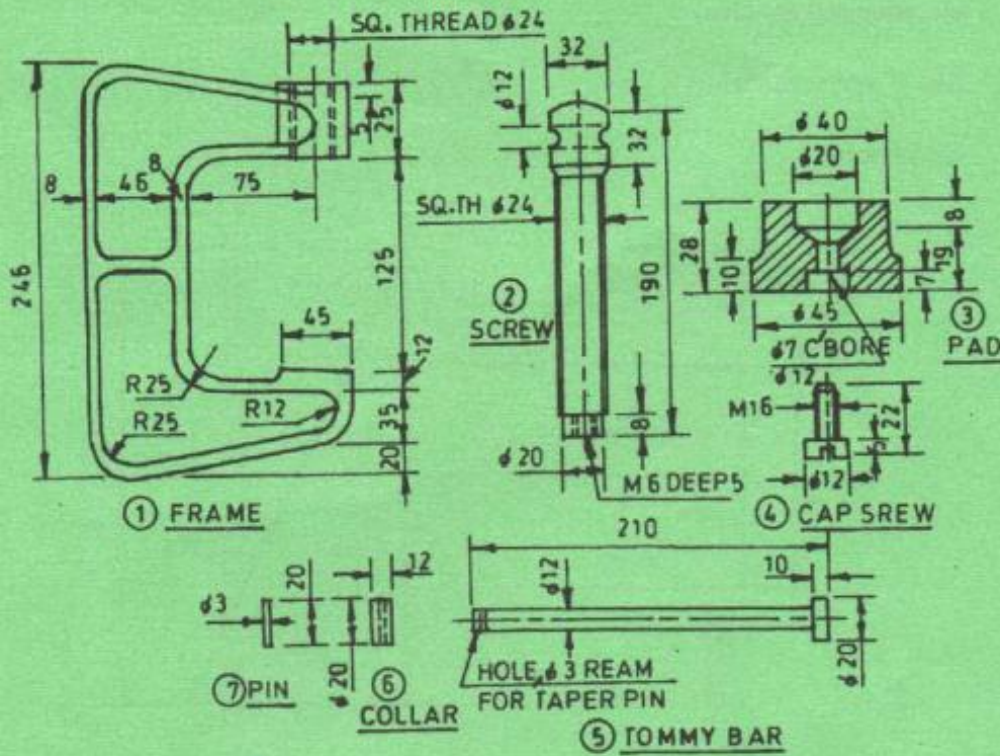
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6. Figure 3 shows parts of a C-clamp. Draw an assembly of the C-clamp and include a parts list (20 marks)



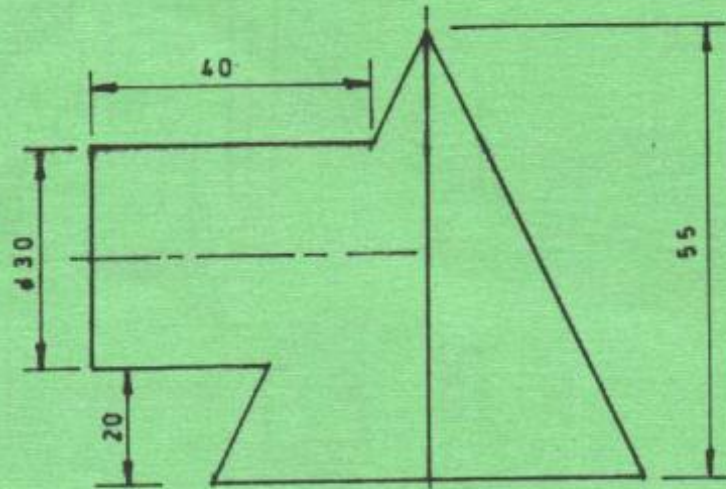
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Fig.3

7. **Figure 4** shows two incomplete views of a cylinder meeting a square pyramid at right angles. Copy the given views and complete the:

- (a) elevation and the plan;
- (b) line of intersection;
- (c) end elevation.

(20 marks)



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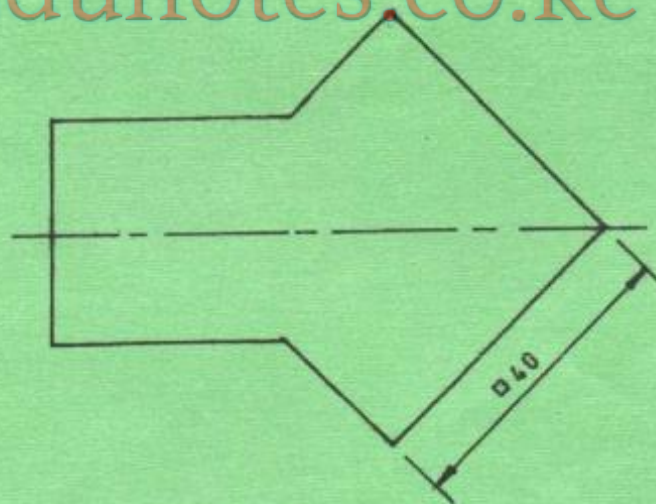


Fig. 4

8. (a) Make free hand sketches of the following engineering hand tools:

- (i) tin snips;
- (ii) cold chisel;
- (iii) flat screw driver;
- (iv) engineers square;
- (v) electric soldering iron.

(10 marks)

(b) Figure 5 shows a point P on a circle of diameter 40 mm. Draw the locus of point P as it rotates 360° along a flat surface AB without slipping. (10 marks)

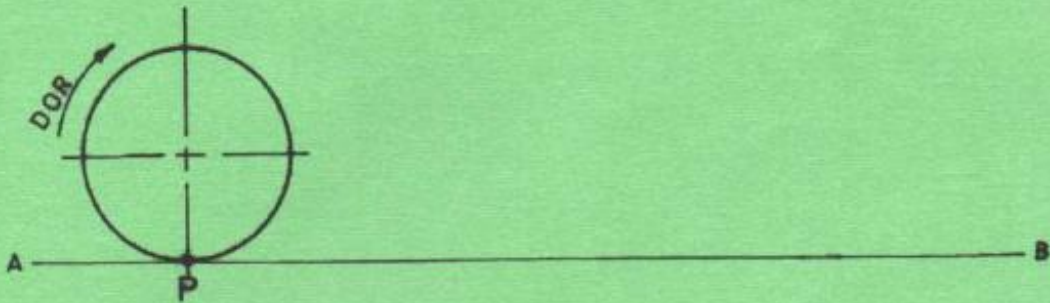


Fig. 5

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