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**ENGINEERING DRAWING, MATERIALS,
PROCESSES AND WORKSHOP TECHNOLOGY**

June/July 2022

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

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Mathematical table/Scientific calculator;

Drawing papers.

Drawing instruments.

*This paper consists of **TWO** sections, **A** and **B**.*

*Answer any **THREE** questions from section **A** and any **TWO** questions from section **B** in the answer booklet and drawing papers provided.*

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

Candidates should answer the questions in English.

This paper consists of 5 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) State **two** safety regulations with regard to each of the following in the workshop:
- (i) house keeping;
 - (ii) hand tools;
 - (iii) machinery;
 - (iv) electricity;
 - (v) lifting.
- (10 marks)
- (b) State:
- (i) **four** objectives of workshop layout.
 - (ii) **three** advantages of a good workshop layout.
- (7 marks)
- (c) List **three** objectives of the Factory Act with regard to safety. (3 marks)
2. (a) Define the following properties of engineering materials:
- (i) ductility;
 - (ii) brittleness.
- (4 marks)
- (b) Describe the following metal finishing processes:
- (i) pickling;
 - (ii) electroplating.
- (4 marks)
- (c) (i) Describe semiconductor materials stating **two** examples.
(ii) Explain the following factors that affect material properties giving **one** example for each:
- (I) heat treatment;
 - (II) metal forming;
 - (III) environmental reactions.
- (12 marks)
3. (a) With aid of sketches, describe the following tools:
- (i) Engineer's steel rule;
 - (ii) Engineer's try square.
- (12 marks)

- (b) State **two** types of cold chisels and their respective uses. (4 marks)
- (c) State **one** safety precaution in the use of each of the following tools:
- (i) files;
 - (ii) chisels;
 - (iii) vernier caliper;
 - (iv) hacksaw.
- (4 marks)
4. (a) (i) List **four** arc welding equipment.
(ii) Illustrate oxy-acetylene gas welding equipment set up. (10 marks)
- (b) (i) State **two** types of chucks for lathe machine.
(ii) Illustrate undercutting or parting off operation on the lathe machine. (6 marks)
- (c) (i) Sketch a countersunk tool used in drilling operation.
(ii) State **two** sheet metal forming tools. (4 marks)

SECTION B: ENGINEERING DRAWING

Answer **TWO** questions from this section.

5. Figure 1 shows front and end elevation of a clock case. Draw an oblique view of the clock with face A as the front side. Include at least **six** dimensions. (20 marks)

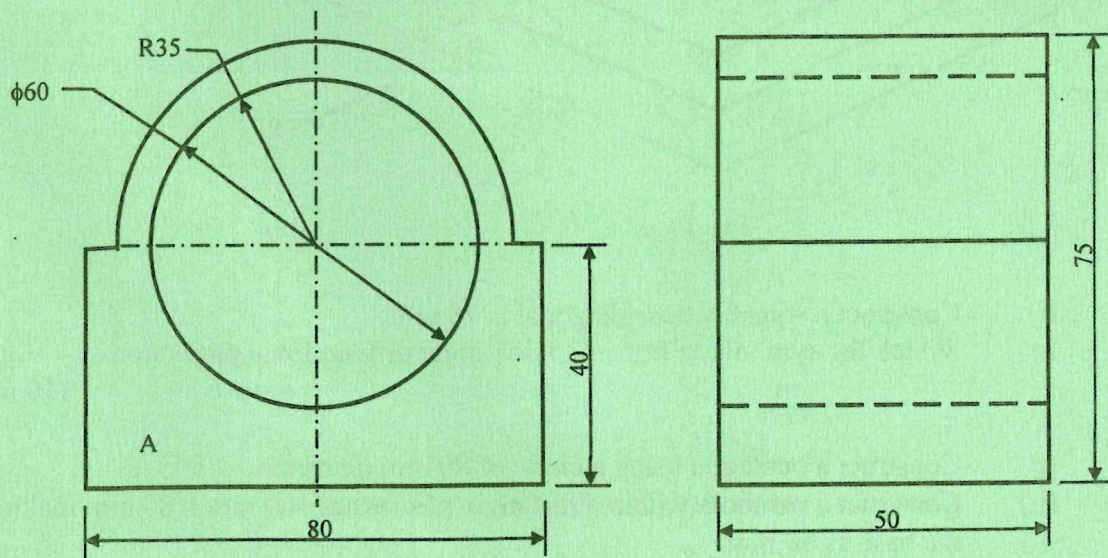


Fig. 1

6. Figure 2 shows a pictorial view of a block. Draw the following views of the figure using first angle orthographic projection:

- (a) a front elevation in the direction of arrow X;
- (b) an end elevation;
- (c) a plan.

Include six major dimensions.

(20 marks)

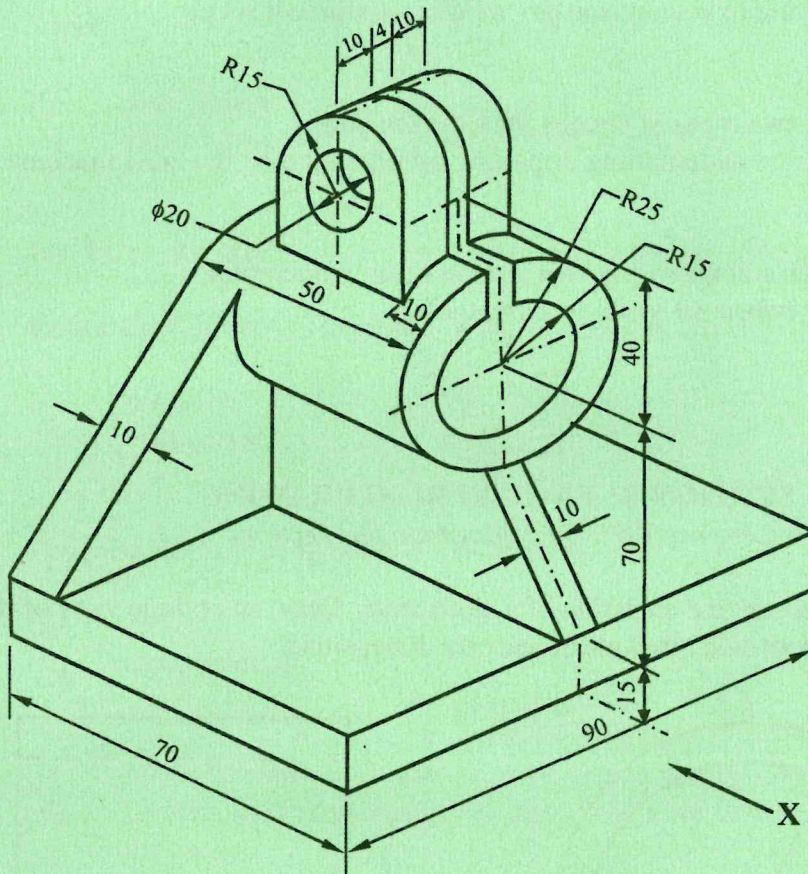


Fig. 2

7. (a) (i) Construct a square whose diagonal is 78 mm;
 (ii) Sketch the symbols of first and third angle orthographic projections.

(10 marks)

- (b) (i) Construct a pentagon using a circle of 80 mm diameter.
 (ii) Construct a parabola within a rectangle measuring 100 mm x 80 mm making the base as 80 mm.

(10 marks)

8. Figure 3 shows an elevation and incomplete plan of a hexagonal pyramid cut at 30° to the horizontal. Copy the elevation and outline of the plan and draw the following:
- complete sectional plan;
 - true shape of the cut portion;
 - surface development of the frustum.

(20 marks)

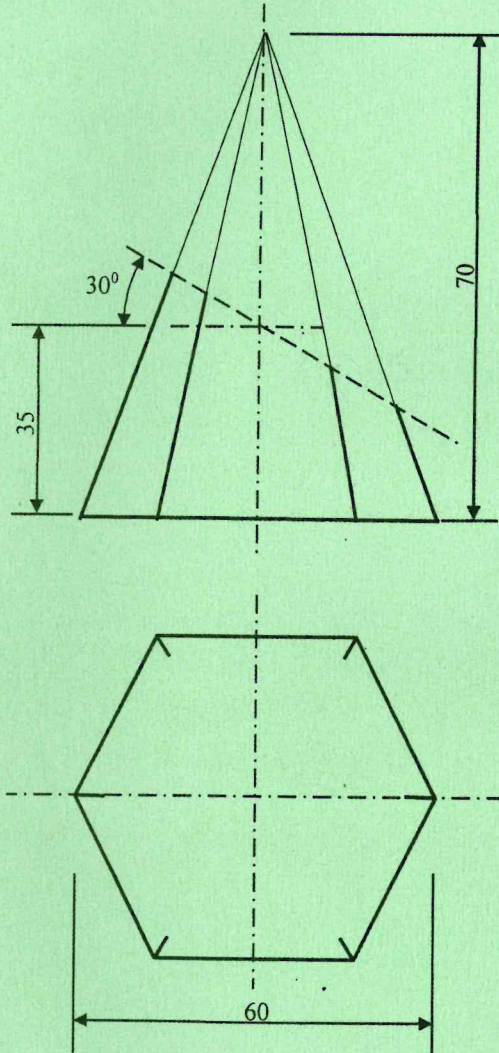


Fig. 3

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