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2602/104

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

**June/July 2023**

**Time: 3 hours**



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

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

**MODULE 1**

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

**3 hours**

**INSTRUCTIONS TO CANDIDATES**

*You should have the following for this examination.*

*Answer booklet;*

*Drawing papers;*

*Drawing instruments;*

*Non-programmable scientific calculator.*

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

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

*All questions carry equal marks.*

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

*Candidates should answer the questions in English.*

**This paper consists of 6 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) (i) List **four** factors considered in the workshop layout;  
(ii) State **four** objectives of workshop layout. (8 marks)
- (b) Outline the procedure for performing mouth to mouth resuscitation. (6 marks)
- (c) State **two** safety precautions with regard to each of the following:  
(i) Machinery;  
(ii) Electricity;  
(iii) Hand tools. (6 marks)
2. (a) (i) List **three** types of drilling machines.  
(ii) Illustrate “reaming” and “boring” operations with regard to drilling. (7 marks)
- (b) Illustrate the following lathe operations:  
(i) plain turning;  
(ii) undercutting. (6 marks)
- (c) (i) List **three** parts of a shaping machine;  
(ii) Sketch **two** surfaces that can be produced by a shaper. (7 marks)
3. (a) State **two** safety precautions with regard to each of the following tools:  
(i) Chisels;  
(ii) Files;  
(iii) Hacksaws. (6 marks)
- (b) Explain the term ‘datum’ in reference to marking out. (2 marks)



(c) (i) Define the following terms used in measurement:

- (I) Limits;
- (II) Fit;
- (III) Tolerance.

(ii) Explain **two** purposes of marking out.

(7 marks)

(d) Sketch:

(i) a Try Square;

(ii) Odd-leg caliper being used to mark the centre of the end of a round bar.

(5 marks)

4. (a) Define the following properties of materials giving **one** example in each case:

(i) Stiffness;

(ii) Ductility;

(iii) Tensile strength;

(iv) Semiconductor.

(6 marks)

(b) (i) Define soft soldering as a joining method.

(ii) List **four** sheet metal operations.

(iii) Outline the procedure for soft-soldering.

(11 marks)

(c) (i) State **two** arc-welding equipment.

(ii) List **one** mechanical joining process.

(3 marks)



**SECTION B: ENGINEERING DRAWING**

*Answer TWO questions from this section.*

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

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

Insert **six** major dimensions.

(20 marks)

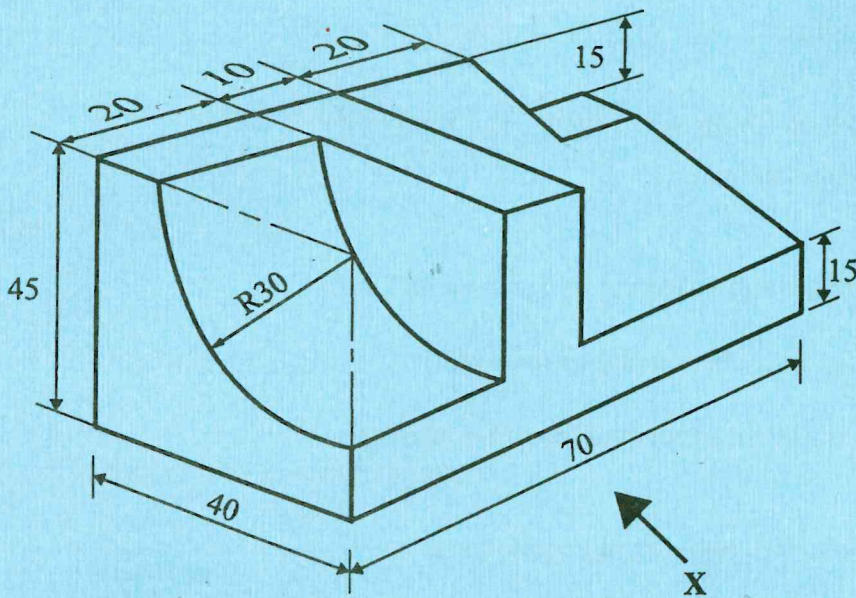


Fig. 1



6. Figure 2 shows two views of a cylinder intersecting a square prism at right angle. Draw the following:

- (a) the given views.
- (b) curve of intersection;
- (c) development of the cylinder.

(20 marks)

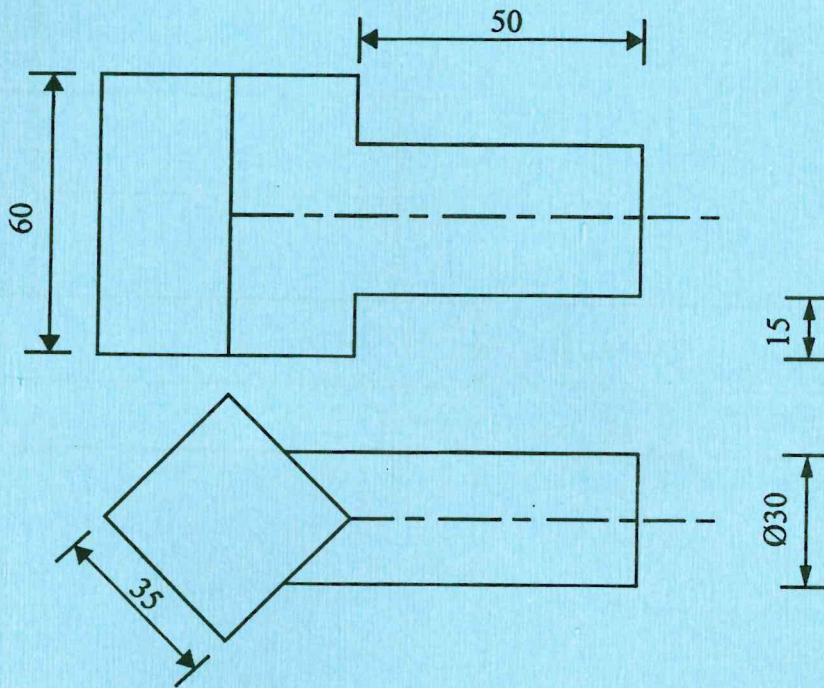


Fig. 2

7. (a) (i) Draw a triangle whose perimeter is 100 mm and the ratio of the sides is 3:4:5 respectively. Circumscribe the triangle.

(ii) Construct a regular heptagon, sides 33 mm.

(13 marks)

(b) Plot the locus of a point P on the circumference of a wheel 70 mm diameter which rolls without slipping along a straight path for one complete revolution.

(7 marks)



8. Figure 3 shows orthographic views of a machined block drawn in third angle projection. Draw, full size, oblique view of the block. (20 marks)

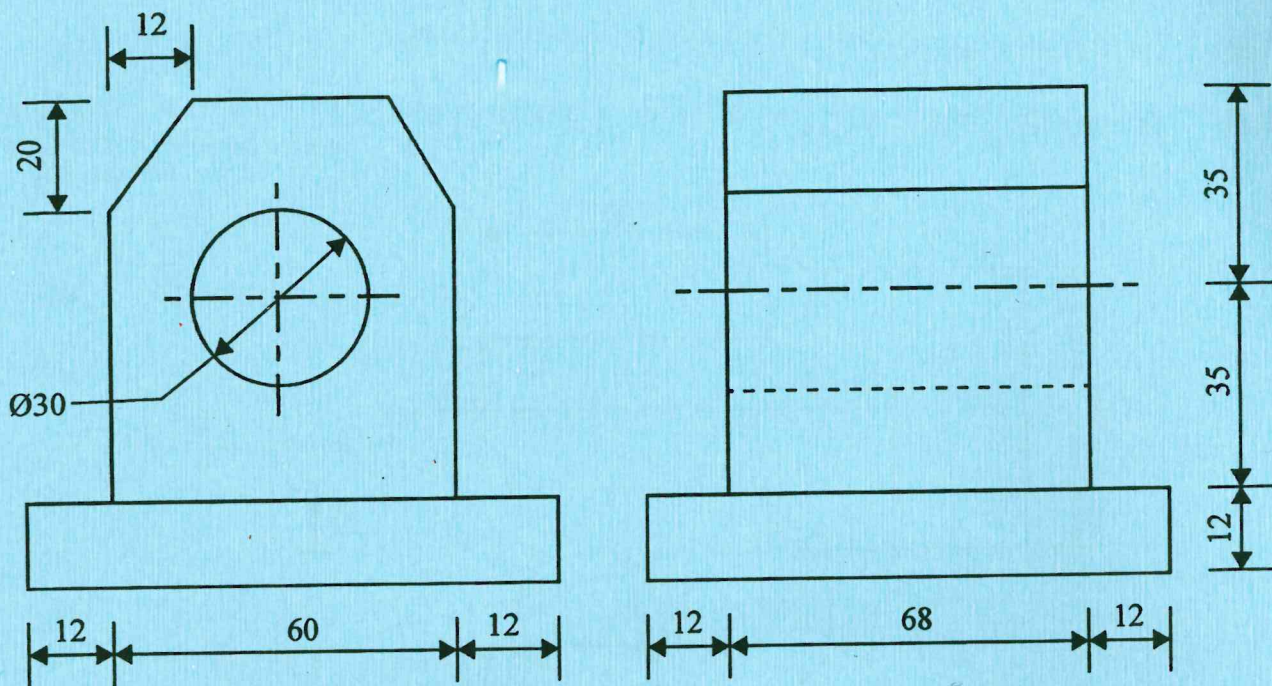


Fig. 3

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