

2901/103
ENGINEERING DRAWING,
WORKSHOP TECHNOLOGY, EHS
AND POLICY FRAMEWORK
June/July 2023
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN PETROLEUM GEOSCIENCE
MODUL I

ENGINEERING DRAWING, WORKSHOP TECHNOLOGY,
EHS AND POLICY FRAMEWORK

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing papers (preferably A3 but A4 may also be sufficient);

Drawing instruments;

A non programmable scientific calculator.

This paper consists of EIGHT questions in FOUR sections; A, B, C and D.

Answer FIVE questions, taking at least ONE question from each section in the answer booklet provided.

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

Candidates should answer the questions in English.

This paper consists of 8 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: ENGINEERING DRAWING

Answer ONE question in this section (All dimensions are in mm)

1. (a) Figure 1 shows two views of an adjustable bearing.

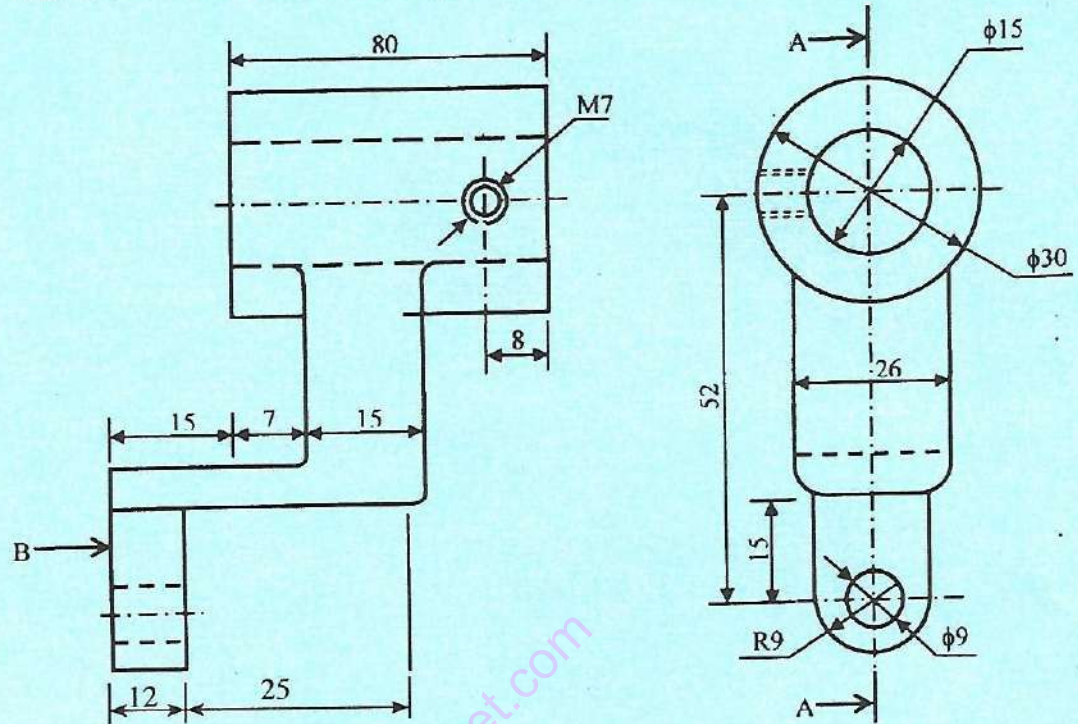


Fig. 1

Draw the object as a cabinet drawing with face B at the front.

(13 marks)

- (b) Two equal circles of $\phi 35$ mm have their centers 80 mm apart. Construct an internal common tangent to the two circles.

(7 marks)

2. (a) Sketch the following power transmission couplings:
- (i) rigid coupling; (4 marks)
 - (ii) universal cube type coupling. (4 marks)
- (b) Figure 2 shows a truncated hexagonal pyramid formed from a pyramid of height 75 mm.

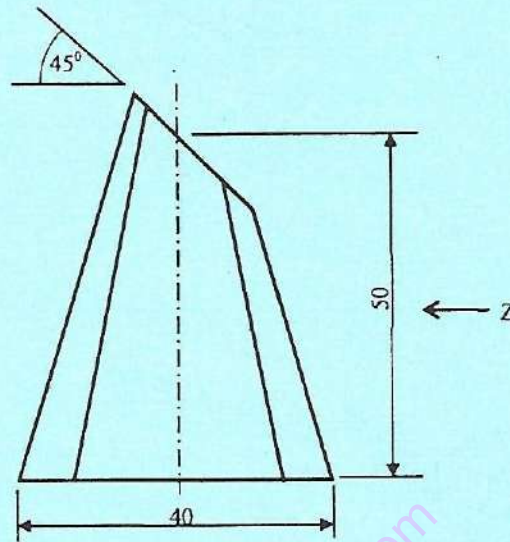


Fig. 2

Copy the figure and draw the:

- (i) plan view;
- (ii) end elevation in the direction of arrow Z ;
- (iii) development of the truncated pyramid .

(12 marks)

SECTION B: WORKSHOP TECHNOLOGY

Answer ONE question from this section

3. (a) Figure 3 shows a vertical milling machine.

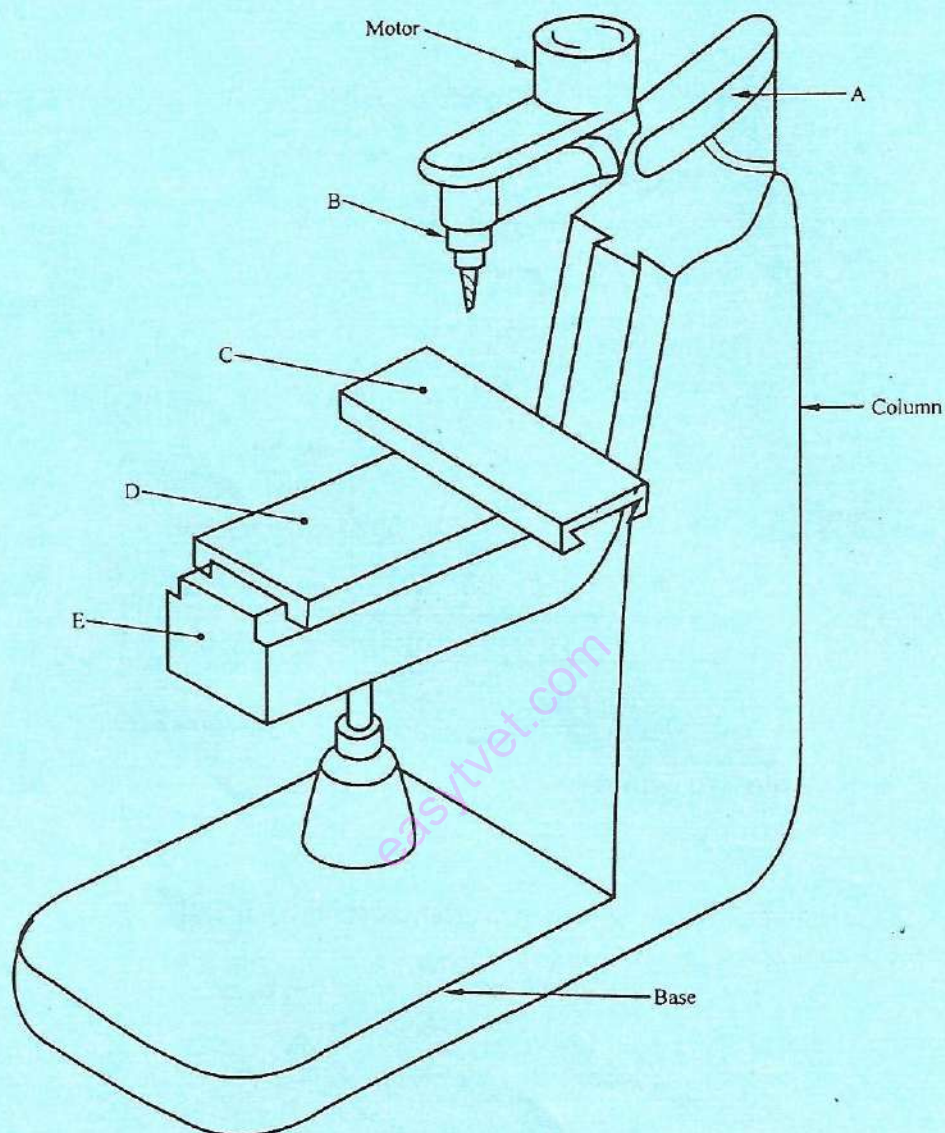


Fig. 3

- (i) Name the parts labelled A, B, C, D and E. (2½ marks)
- (ii) Copy the diagram and show the possible relative movement of parts A, B, C, D and E using arrows. (9½ marks)
- (b) Explain the working principle of a shaping machine. (5 marks)
- (c) State **three** sources of heat in brazing. (3 marks)

4. (a) Figure 4 shows two welding defects.



Fig. 4

- (i) Identify the **two** welding defects. (2 marks)
 - (ii) State **three** causes of each defect. (6 marks)
 - (iii) Give **two** remedies for each defect. (4 marks)
- (b) (i) State **two** metals that constitute the filler metal in soldering. (2 marks)
- (ii) Sketch the following types of bits of a soldering iron.
- (I) simple bit;
 - (II) hatchet bit.
- (6 marks)

SECTION C: E.H.S.

Answer at least ONE question from this section




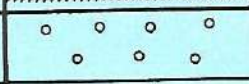
5. Table I gives information on the ratings of likelihood of risk and its severity at an oil exploration site.

Table I

Likelihood	Almost certain	Likely	Possible	Unlikely
	1	2	3	4
Severity	Catastrophic	Major	Moderate	Minor
	1	2	3	4

- (a) Give formula for determination of risk. (1 mark)
Risk = Likelihood × Severity
- (b) Use table I to prepare a risk assessment matrix with likelihood along the x-axis and severity on y-axis. (12 marks)
- (c) The risk values in (b) are grouped into regions as follows:
 - (1 - 2) - Extreme
 - (3 - 4) - Significant
 - (5 - 9) - Moderate
 - (10 - 16) - Low

Redraw the risk matrix to illustrate the risk regions using the following key:

Extreme	
Significant	
Moderate	
Low	

(4 marks)

(d) Calculate the percentage area covered by the extreme region.

(3 marks)

6. (a) State **six** disadvantages of using oil-based muds as a drilling fluid in gas-oil production. (6 marks)

(b) Figure 5 shows various stages of the environmental impact assessment process. Study it and answer the questions that follow.

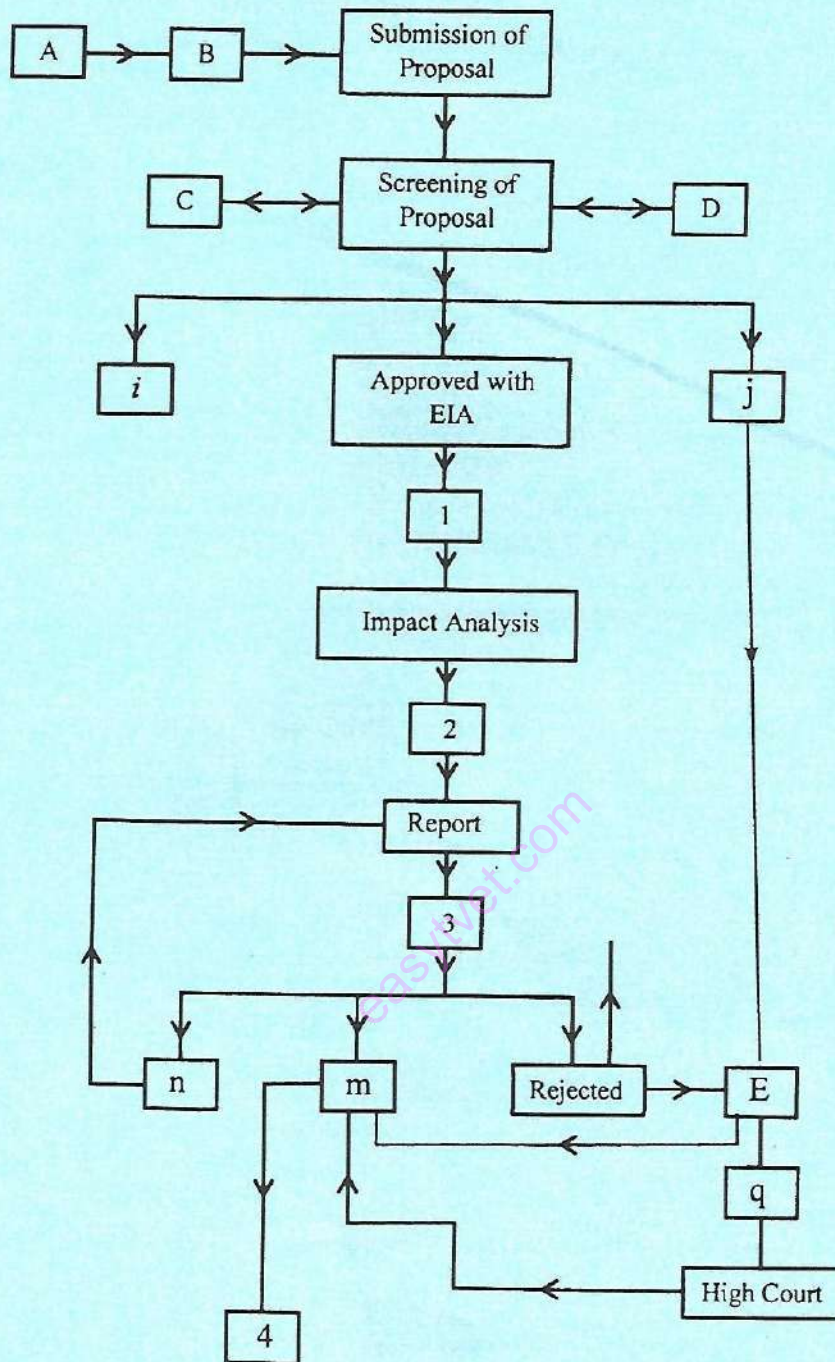


Fig. 5

- (i) Identify the individuals or organisations indicated as A, B, C, D and E. (5 marks)
- (ii) Name the stages numbered 1, 2, 3 and 4. (4 marks)
- (iii) State the decisions made at i, j, k, m, n and q. (5 marks)

SECTION D: POLICY FRAMEWORK
Answer at least ONE question from this section

7. (a) State **two** differences between:
- (i) public law and private law.
 - (ii) procedural law and substantive law.
- (4 marks)

(b) Explain **five** essential elements of a valid contract. (10 marks)

(c) Explain **three** types of domicile as per the Kenyan law. (6 marks)

8. (a) A government officer earns a basic salary of Ksh 45,689 per month. He is given house and travelling allowances of Ksh 17000 and Ksh 10,500 respectively.

- (i) Calculate the officer taxable income. (2 marks)
- (ii)

Table II

Monthly income (Ksh)	Tax rate (%)
Below 10165	10
10165 to below 19741	15
19741 to below 29319	20
29319 to below 38393	25
38393 and above	30

Use table II to determine his total tax. (8 marks)

(iii) If Kenya Revenue Authority gives a personal relief of Ksh 1,056 per month, calculate his tax payable. (2 marks)

(iv) At the end of the month the following deductions are also made on his income:

NHIF : 1,200/=

Sacco loan : 15,350/=

Determine his net monthly income. (4 marks)

(b) Name four interests in land that confer a right enforcement against the land of another. (4 marks)

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