2901/103
ENGINEERING DRAWING,
WORKSHOP TECHNOLOGY, EHS
AND POLICY FRAMEWORK
Oct./Nov. 2022
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 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: ENGINEERING DRAWING

*Answer at least **ONE** question from this section* (All dimensions are in mm)

1. Figure **1** shows an isometric view of a machine component.

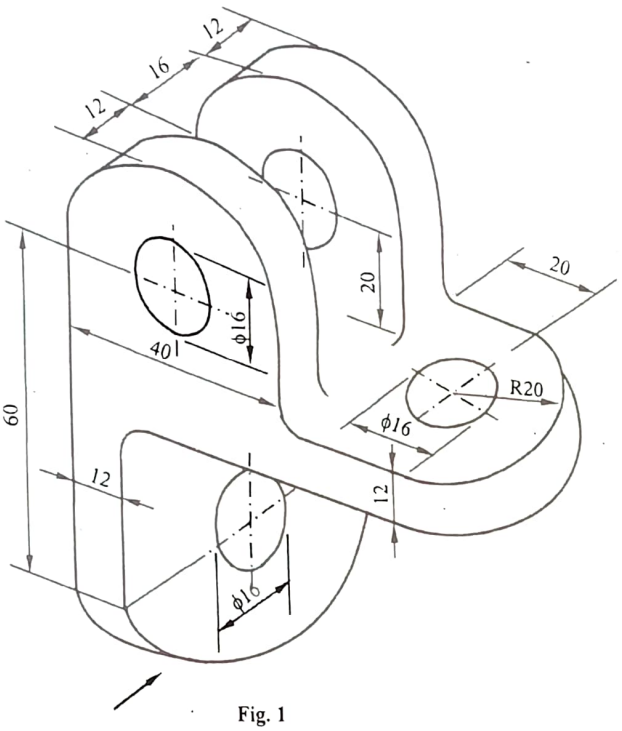

Fig. 1

(a) Draw the following views in first angle orthographic projection:

(i) front elevation in the direction of arrow shown;
(ii) a suitable end elevation;
(iii) plan view.

(17 marks)

(b) Insert **six** major dimensions. (3 marks)

2. Figure **2** shows a front elevation of two cylinders intersecting perpendicularly.

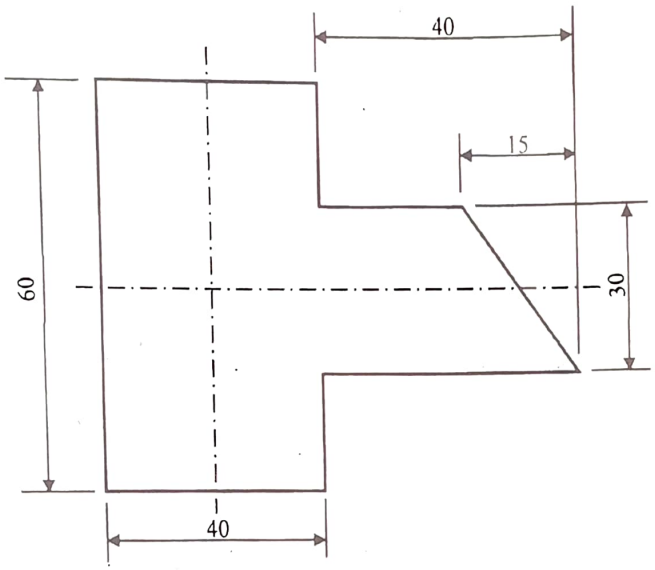

Fig. 2

Copy the elevation and construct the following:

(a) plan view; (6 marks)
(b) curve of interpenetration; (8 marks)

(c) development of smaller cylinder. (6 marks)

SECTION B: WORKSHOP TECHNOLOGY

*Answer at least **ONE** question from this section*

3. (a) (i) Illustrate the draw filing method. (3 marks)
(ii) State **two** functions of draw filing. (2 marks)

(b) Illustrate the following weld joints:

(i) double traverse lap joint; (2 marks)
(ii) single V butt joint; (2 marks)
(iii) T-joint. (2 marks)

(c) State **five** safety precautions taken when using a drilling machine. (5 marks)

(d) Differentiate between soldering and brazing process. (4 marks)

(a) (i) Name a suitable instrument for cutting sheet metal of each of the following thickness:

(I) $\leq 0.9\ mm$

(II) $\leq 1.5\ mm$

(III) $\leq 2.0\ mm$

(3 marks)

(ii) Illustrate the bending of a sheet metal in a fly press. (4 marks)

(b) Give **one** function of each of the following parts of a milling machine:

(i) knee; (1 mark)
(ii) saddle; (1 mark)
(iii) table; (1 mark)
(iv) spindle; (1 mark)
(v) arbor. (1 mark)

(c) Using a labelled diagram, describe the process of thread cutting between centres of a lathe machine.

(8 marks)

SECTION C: ENVIRONMENTAL HEALTH AND SAFETY

*Answer at least **ONE** question from this section*

5. (a) State **seven** environmental roles of National Environmental Management Authority (NEMA). (7 marks)

(b) Figure **3** shows an activity carried out during exploration stage of petroleum exploitation. Study it and answer questions that follow.

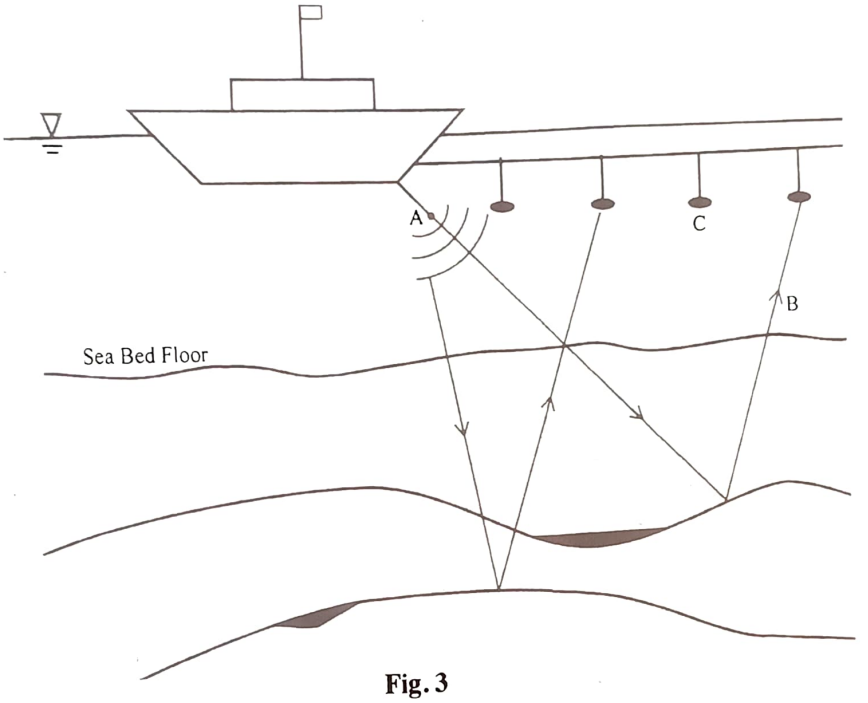

Fig. 3

(i) name the activity; (1 mark)

(ii) identify the parts labelled A, B and C; (3 marks)

(iii) state **two** functions of the activity in a (i); (2 marks)

(iv) name **two** other methods that may be used. (2 marks)

(c) (i) Define the term 'hazard' as used in risk management. Give **one** example. (2 marks)

(ii) The likelihood of harm at an oil depot is 2 while the severity of harm is 3. Calculate the risk to an employee at the depot. (3 marks)

4. (a) (i) Name a suitable instrument for cutting sheet metal of each of the following thickness:

(I) $\leq 0.9\ mm$

(II) $\leq 1.5\ mm$

(III) $\leq 2.0\ mm$ (3 marks)

(ii) Illustrate the bending of a sheet metal in a fly press. (4 marks)

(b) Give **one** function of each of the following parts of a milling machine:

(i) knee; (1 mark)
(ii) saddle; (1 mark)
(iii) table; (1 mark)
(iv) spindle; (1 mark)
(v) arbor. (1 mark)

(c) Using a labelled diagram, describe the process of thread cutting between centres of a lathe machine. (8 marks)

6. (a) State **six** potential impacts of oil and gas exploitation on plants. (6 marks)

(b) State **six** problems encountered while conducting risk assessment. (6 marks)

(c) (i) List **three** steps involved in an environmental management system. (3 marks)

(ii) explain **five** benefits of an environmental management system to an organization. (5 marks)

SECTION D: LEGAL AND POLICY FRAMEWORK

*Answer at least **ONE** question from this section*

7. (a) Explain the following terms as used in the Kenya Citizenship and Immigration Act, 2011.

(i) border;
(ii) dependent;
(iii) exit.

(3 marks)

(b) Table **I** shows the cost of production of drill bits at a factory. Study it and use it to answer the questions that follow.

Table I

Cost of production (US $)	340	470	595	818	910
No. of drill bits	6	14	21	32	36

(i) Draw a graph of cost of production against number of drill bits. (7 marks)

(ii) Use the graph drawn in b (i) to determine:

(I) cost equation for the production of drill bits; (4 marks)

(II) number of drill bits that will cost US $ 2000. (2 marks)

(c) List **four** components of a project proposal. (4 marks)

8. (a) Explain **six** safety requirements at a workplace as per the Occupational Safety and Health Act, 2007, of the Laws of Kenya. (12 marks)

(b) Outline **two** differences between ownership and possession of property. (4 marks)

(c) State **four** defences to tort. (4 marks)

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