1305/314
PLUMBING CRAFT THEORY
June/July 2016
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

PLUMBING CRAFT CERTIFICATE

PLUMBING CRAFT THEORY

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
- *Drawing instruments;*
- *Mathematical table/scientific calculator;*
- *Answer booklet.*

*This paper consists of **EIGHT** questions.*
*Answer **FIVE** questions.*
All questions carry equal marks.
Maximum marks for each part of a question are indicated.
Candidates should answer the questions in English.

This paper consists of 4 printed pages.

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

Turn over

1. (a) Differentiate between ferrous and non ferrous metals. State **two** examples in each case. (4 marks)

(b) State **four** reasons for alloying metals. (4 marks)

(c) Outline **five** design principles of direct cylinder system of hot water supply. ($7\frac{1}{2}$ marks)

(d) List **three** classifications of fire. State suitable extinguishing agent for each class. ($4\frac{1}{2}$ marks)

2. (a) Calculate the power output of a centrifugal pump which can lift 200 litres from a shallow well 6 m deep in 10 seconds. (5 marks)

(b) Explain the following safety precautions observed in a plumbing workshop.

(i) clothing;
(ii) behaviour;
(iii) self-care. (6 marks)

(c) (i) Sketch and label a direct cold water system in a domestic building.
(ii) State **four** characteristics of a domestic cold water supply system. (9 marks)

3. (a) (i) State **two** classes of mild steel pipes, stating their colour coding and the use of each. (3 marks)
(ii) State any **five** characteristics of a drainage system. (5 marks)

(b) With the aid of a labelled sketch differentiate between "leftward" and "rightward" welding techniques. (7 marks)

(c) (i) Define the term alloy.
(ii) State the metal composition of:

I) brass;
II) bronze. (5 marks)

4. (a) A fourteen storey building is to be supplied with water from the mains. The mains pressure is 300 Kpa and the water can be pumped directly from the mains.

(i) Determine the floor height to which the pressure from the mains can supply.
(ii) Illustrate the supply of the water to all the floors. (12 marks)

(b) With the aid of a sketch explain how an A.C. arc welding set operates. (8 marks)

5. (a) With the aid of a sketch explain how a grinnel-type quartzoid sprinkler operates. (8 marks)

(b) Sketch and label a joint between a water tank and a distribution pipe. (6 marks)

(c) Calculate the diameter of a pipe in millimeters used to discharge 1.25 litres of water per second when the constant head is 4 m and the total length of the pipe is 45.5 m.

Take:

$$q = \sqrt{\left(\frac{d^5 \times H}{25 \times L \times 10^3}\right)}$$

Where: q = discharge through pipe in l/s.
d = diameter of pipe in mm.
H = head of water in m.
L = total length of pipe in m. (6 marks)

6. (a) Sketch and label a single stack drainage system in a two storey building showing the common appliances. (12 marks)

(b) State **four** Kenya Building code requirements for sanitary appliances. (4 marks)

(c) Calculate the amount of heat required to raise the temperature of 250 litres of water from 20° C - 100° C. Take specific heat capacity of water = 4.18 Kj. (4 marks)

7. (a) Estimate the cost of installing sanitary appliances using the information given in **table 1.**

Table 1

Item No.	Description	Quantity	Unit cost
1	Water closet and cistern	2 No.	3,750
2	Bath tub	1 No.	7,850
3	Wash hand basin	2 No.	1,900

Allowances:

I) Labour at 10% cost of appliance.
II) Overheads at 5% cost of appliance.
III) Profit at 8% cost of appliance. (8 marks)

(b) Outline **four** functions of the coating in an arc welding electrode. (6 marks)

(c) With the aid of sketches show the sequence of forming a single-lock welt. (6 marks)

8. (a) State the procedure of tinning a soldering bit. (4 marks)

(b) List **four** positions where manholes are used in drainage systems. (4 marks)

(c) (i) Define the following terms as used in water treatment.

I) Coagulation.
II) Dechlorination. (4 marks)

(ii) Name **two** reducing agents used in water treatment. (2 marks)

(d) List **four** properties of a coagulant. (6 marks)

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