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



THE KENYA NATIONAL EXAMINATIONS COUNCIL
PLUMBING CRAFT CERTIFICATE

PLUMBING CRAFT THEORY

3 hours

copy

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.

Ferrous - Contain iron - cast iron, Aluminium
 Non ferrous - Do not contain iron -

brass - Copper and Zinc

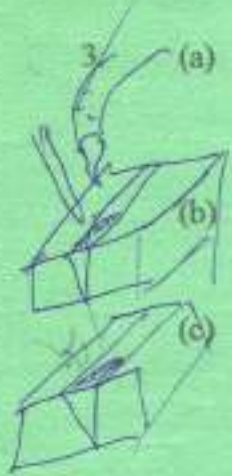
1. (a) Differentiate between ferrous and non ferrous metals. State two examples in each case. (4 marks)
- (b) State four reasons for alloying metals. (4 marks)
- (c) Outline five design principles of direct cylinder system of hot water supply. (7 1/2 marks)
- (d) List three classifications of fire. State suitable extinguishing agent for each class. (4 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.

19 - 1/2
 25 - 3/4
 32 - 1
 35 -

Class A -> wood
 class B -> flammable
 class C -> metals
 class D -> etc

- (c) (i) Sketch and label a direct cold water system in a domestic building. (9 marks)
- (ii) State four characteristics of a domestic cold water supply system. (5 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; - Copper and Zinc
 - II) bronze - Copper and tin

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:

$$q = \sqrt{\left(\frac{d^5 \times H}{25 \times L \times 10^6}\right)}$$

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)

- (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)



Handwritten calculations for Table 1:

3750 x 2 = 7500
 7500 + 7850 = 15350
 15350 + 3800 = 19150

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 7500 + 7850 = 15350
 15350 + 3800 = 19150

19150 x 10% = 1915
 19150 x 5% = 957.5
 19150 x 8% = 1532

- (c) (i) Define the following terms as used in water treatment.
- I) Coagulation. (4 marks)
 - II) Dechlorination. (2 marks)
- (ii) Name two reducing agents used in water treatment. (6 marks)
- (d) List four properties of a coagulant. (2 marks)



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