

2528/204
2922/204
ENVIRONMENTAL ANALYTICAL TECHNIQUES
AND LABORATORY MANAGEMENT
Oct./Nov. 2011
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY
MODULE II

4. ENVIRONMENTAL ANALYTICAL TECHNIQUES
AND LABORATORY MANAGEMENT

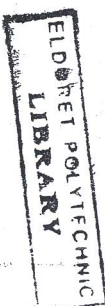
3 hours

INSTRUCTION TO CANDIDATES

You should have the following for this examination:

Answer booklet;
Non-programmable scientific calculator;

This paper consists of TWO sections: A and B.
Answer ALL the questions in section A and any THREE questions from section B.
Each question in section A carries 4 marks, while each question in section B carries 20 marks.
Maximum marks for each part of a question are shown at the end of each question.



This paper consists of 3 printed pages.

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

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Turn over

SECTION A (40 marks)
Answer ALL questions in this section.

1. State any four characteristics of a solvent for recrystallization. (4 marks)
2. Explain what is meant by the term capacity of a column. (4 marks)
3. Distinguish between a primary standard and a secondary standard. (4 marks)
4. An environmental sample of $K_3Fe(CN)_6$ has a concentration of 63.3 ppm. Calculate the concentration of K^+ ions in the sample. ($K_3Fe(CN)_6 = 329.3$) (4 marks)
5. You are provided with the following information on stock concentrated sulphuric acid:

m.wt	98.07
Assay	99%
Specific gravity	1.85
Iron	0.001
Zinc	0.05

6. Calculate the concentration of the acid in moles per litre. (4 marks)
7. Identify any four precautions undertaken when running paper chromatography. (4 marks)
8. Name any four features of management. (4 marks)
9. Identify any four factors that affect organizational goal setting. (4 marks)
10. List any four types of budgets. (4 marks)
11. Define the term filing. (2 marks)
12. State any two disadvantages of alphabetical filing. (2 marks)

SECTION B (60 marks)
Answer any THREE questions from this section.

1. (a) Explain any five roles of a manager in an organization. (10 marks)
- (b) Explain any five barriers to planning in an institution. (10 marks)
2. (a) Define the term 'delegation of power'. (2 marks)
- (b) Explain any six circumstances under which manager delegates power. (12 marks)
- (c) Identify any six implications of System theory to managers in an institution. (6 marks)

13. (a) Explain four desirable properties of a standard solution. (8 marks)
- (b) Two solid samples of sodium chloride and silver chloride were accidentally mixed. Describe using diagrams how to obtain pure samples of sodium chloride and silver chloride solids. (10 marks)

14. (a) State any two characteristics of filter media. (2 marks)
- (b) Describe how thin layers can be prepared to be used in thin layer chromatography. (10 marks)

15. (a) Describe the following applications of ion exchangers: (5 marks)
 - (i) softening of hard water;
 - (ii) de-ionisation of water. (5 marks)

Plants in a certain area suddenly started drying up and buildings and iron sheets became corroded with time. Describe the five stages of the analytical procedure undertaken to identify the cause of the problem. (10 marks)

A 0.804 g sample of iron ore, Fe_3O_4 was dissolved in acid and reduced to iron (II) ions solution. This solution required 47.22 ml of 0.02242 M potassium permanganate solution on titration represented by the equation:



Calculate the percentage iron(II) in the sample. ($Fe = 55.847$) (10 marks)

