Name: _____ Index No: _____

2528/204
2922/204
ENVIRONMENTAL ANALYTICAL TECHNIQUES AND LABORATORY MANAGEMENT
Oct./Nov. 2014
Time: 3 hours

Candidate's Signature: _____

Date: _____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY
MODULE II

ENVIRONMENTAL ANALYTICAL TECHNIQUES AND LABORATORY MANAGEMENT

3 hours

LIBRARY

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.
Sign and write the date of examination in the spaces provided above.
You should have a non-programmable scientific calculator for this examination.
This paper consists of TWO sections; A and B.
Answer ALL the questions in section A and any THREE questions from section B in the spaces provided in this question paper.
Each question in section A carries 4 marks while each question in section B carries 20 marks.
Candidates should answer the questions in English.

For Examiner's Use Only

SECTION A

Question	1	2	3	4	5	6	7	8	9	10	Total
Candidate's score											

SECTION B

Question	11	12	13	14	15	Total
Candidate's score						

Grand Total

This paper consists of 16 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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SECTION A (40 marks)

Answer ALL the questions in this section in the spaces provided.

1. Name **four** heating techniques in a laboratory. (4 marks)

2. Outline the procedure used in vacuum distillation. (4 marks)

3. (a) List **two** factors which crystallization depends on during purification. (2 marks)

(b) Two solvents are equally suitable for recrystallization process. State **two** factors of preference in choosing one of them. (2 marks)

4. (a) Explain the reason for sublimation of dry ice. (2 marks)

(b) State **two** disadvantages of sublimation as a separation technique. (2 marks)

5. Explain **two** factors that govern the type of solvent used in soxhlet extraction. (4 marks)

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50 kg of iron NaOH are dissolved in 20.0 litres of water. In addition, 2.0 litres of this solution exactly neutralizes 32 litres of hydrochloric acid. Determine the concentration of the acid.

(3 marks)

7. State four reasons for the opposition of scientific management by Kenyan industries to Central Organization of Trade Unions (COTU).

8. Name four basic elements of a control system in management. (4 marks)

9. (a) Define the term authority. (1 mark)

(b) State three reasons that make people accept authority. (3

10. Name the type of management style that is ineffective when:

(a) the leader lacks expertise; (1

(b) employees must be coordinated; (

(c) employees are highly skilled; (

(d) the leader is not credible. (

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SECTION II (40 marks)

Answer ONLY FOUR questions from this section in the spaces provided after each question.

12. (a) Explain the role of a leader during the formation of an organization. (5 marks)

(b) Outline the procedure followed in the following within an organization:

(i) purchasing; (5 marks)

(ii) receiving. (5 marks)

13. (a) Name five labour laws enacted by the Kenyan parliament in the year 2007. (5 marks)

(b) There has been intense disputes in the Kenyan labour environment. Outline the role of the following in the settlement of these industrial disputes:

(i) Collective Bargaining Agreement (CBA); (2 marks)

(ii) Federation of Kenya Employers (FKE); (2 marks)

(iii) Industrial Court. (2 marks)

14. (a) State the pH condition of the mobile buffer required for effective separation of amino acids in paper chromatography of amino acids. (1 mark)

(b) (i) Distinguish between cation and anion exchange chromatography. (2 marks)

(ii) Explain the process of cation exchange chromatography. (4 marks)

15. (a) (i) State two reasons of using a filter paper during titration. (2 marks)

(ii) Outline the procedure of folding a filter paper. (3 marks)

(b) (i) Explain two possible problems that occur during titration. (2 marks)

(ii) Name four ways of overcoming the problems in 14(b)(i). (4 marks)

16. (a) Distinguish between the following types of titration techniques:

(i) direct and indirect titration; (2 marks)

(ii) back and replacement titration. (2 marks)

(b) Name four requirements for titration. (4 marks)

(c) A 5.00 g solid mixture of anhydrous calcium chloride ($CaCl_2$) and Sodium Nitrate ($NaNO_3$) was dissolved in 250 ml of deionised water to form a solution mixture. 21.2 ml of 0.1 mol/dm³ Silver Nitrate ($AgNO_3$) solution precipitated all the chloride ions when titrated against 25.0 ml of the solution mixture in a conical flask. (Ca = 40; Cl = 35.5).

Determine:

(i) the moles of chloride ions titrated; (2 marks)

(ii) the equivalent moles of calcium chloride titrated; (2 marks)

(iii) the equivalent mass of calcium chloride titrated; (2 marks)

(iv) the total mass of calcium chloride in the original 5.00 g of the mixture; (2 marks)

(v) the % of calcium chloride and sodium nitrate in the original 5.00 g of the mixture. (4 marks)

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