

2922/202  
ENVIRONMENTAL POLLUTION CONTROL,  
HEALTH AND SAFETY  
Oct./Nov. 2021  
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY

MODULE II

ENVIRONMENTAL POLLUTION CONTROL, HEALTH AND SAFETY

3 hours

**INSTRUCTIONS 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 in the answer booklet provided.*

*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 as shown.*

*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.**

SECTION A (40 marks)

Answer ALL questions in this section.

1. Write a chemical equation for the production of each of the following acids from pollutant atmospheric gases:
  - (a) carbonic acid; (2 marks)
  - (a) sulphuric acid; (2 marks)
2. State **four** properties of carbamates. (4 marks)
3. With the aid of chemical equations, describe the removal of sulphur dioxide gas in pulp and paper industry using combustion process. (4 marks)
4. State **four** reasons which make persistent organic pollutants to be of environmental concern. (4 marks)
5.
  - (a) Describe carbonyl compounds. (2 marks)
  - (b) State **two** characteristics of carbonyl compounds which make them environmental pollutants. (2 marks)
6. State **four** reasons which discourage workers from reporting accidents in the workplace. (4 marks)
7. State **four** situations which make environmental officer in charge of safety in an industrial workplace recommend for training of workers. (4 marks)
8. Identify **four** draw backs associated with the use of personal protective clothing in a chemical processing factory. (4 marks)
9. List any **four** tasks performed by an employee in a mining company to ensure safety. (4 marks)
10. State **four** common causes of fires in the industrial workplace. (4 marks)

SECTION B (60 marks)

Answer any THREE questions from this section.

11. (a) Describe the photochemical smog phenomenon. (2 marks)
- (b) Write chemical equations describing each of the following reactions of nitrate radical in the atmosphere:
- (i) formation; (2 marks)
- (ii) dissociation. (2 marks)
- (c) Name four oxidation species that can oxidize  $\text{SO}_2$  during smog formation. (4 marks)
- (d) Describe four harmful effects of smog in the environment. (8 marks)
- (e) State two ways of minimising emission of harmful gases from an automobile. (2 marks)
12. (a) Explain why detergents are better cleaning agents than soap in relation to environmental safety. (2 marks)
- (b) State five negative effects of detergents in waste treatment processes. (5 marks)
- (c) Explain why linear alkyl sulfonate is a better surfactant than alkyl benzene sulfonate. (2 marks)
- (d) (i) Describe the function of detergent builders. (2 marks)
- (ii) Name five detergent additives that cause environmental pollution. (5 marks)
- (e) State four properties of pesticides that make them environmental contaminants. (4 marks)
13. (a) Explain five measures taken by a safety engineer in a workplace to minimize accidents. (10 marks)
- (b) Describe five roles played by safety and health professionals in ensuring safety in an organization. (10 marks)

14. (a) Distinguish between a hazard and a risk as used in occupational safety. (2 marks)
- (b) Explain each of the following measures used to reduced hazards in the workplace:
- (i) hazard control measures; (2 marks)
  - (ii) engineering control measures; (2 marks)
  - (iii) personal protective equipment measures. (2 marks)
- (c) (i) State **four** goals of incident investigation in the workplace. (4 marks)
- (ii) A safety personnel in a manufacturing firm is tasked with investigating an explosion which occurred in one of its warehouses causing loss of life, injuries and damage to property. Outline steps undertaken to investigate the incident. (8 marks)
15. (a) Describe the following classification of toxic materials:
- (i) nephrotoxins; (2 marks)
  - (ii) hepatotoxins; (2 marks)
  - (iii) asphyxiants. (2 marks)
- (b) State **three** reasons for carrying out each of the following health checks on employees in an organisation,
- (i) pre-employment medical test; (3 marks)
  - (ii) periodic medical test; (3 marks)
  - (iii) post employment medical test. (3 marks)
- (c) State **five** benefits of a good health care system to an organisation. (5 marks)

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