

2528/202
2922/202
ENVIRONMENTAL POLLUTION
CONTROL, HEALTH AND SAFETY
June/July 2018
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. State **four** factors that contribute to high levels of pollution in manufacturing industry. (4 marks)
Chimney, Plume, Rain
2. Explain **two** methods used to control emissions of harmful gases into the atmosphere. (4 marks)
Scrubber, Electrostatic precipitator
3. (a) Define 'acid rain'. (2 marks)
Acid rain is rain that has become acidic due to the presence of sulfuric acid and nitric acid.
- (b) State **two** effects of acid rain on plants. (2 marks)
Corrode leaves, Stunts growth
4. State **four** uses of organotin compounds. (4 marks)
5. State **four** factors considered in designing an effective smock stack for a chemical industry. (4 marks)
6. Define the following terms as used in occupational health: (4 marks)
Height, Load
 - (a) occupational diseases; (2 marks)
Asbestosis, Silicosis
 - (b) occupational hygiene. (2 marks)
Water, Air, Noise
7. State any **four** objectives of monitoring workers exposure to hazardous substances. (4 marks)
Supervise, Monitor, Measure
8. Explain **two** reasons for carrying out medical examination before appointment of a worker as an operator in a chemical processing factory. (4 marks)
9. State any **four** duties of a safety and health office in a cement processing factory. (4 marks)
Records, Hazardous
10. State **four** health and safety rights that workers are entitled to in a company. (4 marks)
Participate in safety committees, Receive training, Know the location of safety equipment, Know the location of first aid kit

SECTION B (60 marks)

Answer any **THREE** questions from this section.

11. (a) Define 'bio-refractory organics'. (2 marks)
- (b) A chemical analyst found traces of bio-refractory organic substances in water. Explain **four** ways that can be used to remove them. (8 marks)
- (c) Draw the chemical structures of the following organochlorine insecticides:
- (i) Dichlorodiphenyltrichloroethane (DDT); (2 marks)
- (ii) Methoxychlor. (2 marks)
- (d) (i) State **two** parts in chemical structure of a detergent. (2 marks)
- (ii) Explain **two** ways in which detergent additives cause environmental pollution. (4 marks)
12. (a) Differentiate between stratospheric ozone and tropospheric ozone. (4 marks)
- (b) Explain how tropospheric ozone is formed. $O_3 + O_2 \rightarrow O_2$ (3 marks)
- (c) State any **four** harmful effects of ozone as an air pollutant. (4 marks)
- (d) State **five** measures a County environmental department can put in place to improve air quality in a highly industrialized town. (5 marks)
- (e) With the aid of chemical equations, explain how chlorofluorocarbons (CFCs) destroy the ozone layer. $Cl-CF_2-Cl$ (4 marks)
13. (a) Explain any **five** responsibilities of employers in ensuring a safe and healthy working environment. (10 marks)
- (b) Describe **five** duties that workers in a manufacturing industry should undertake in ensuring their own safety. (10 marks)
14. (a) State **six** conditions that a safety and health committee in an organization should be provided with to ensure success in discharging their duties. (6 marks)
- (b) Explain **seven** rights that a safety and health officer have according to occupational safety and health Act in discharging duties. (14 marks)

15. (a) A safety engineer is required to select protective clothing for workers handling equipment and hazardous chemicals. Explain any **five** factors that should be taken into consideration. (10 marks)
- (b) Explain how the following factors contribute to accidents in the workplace:
- (i) lack of implementation of legislative provisions; (3 marks)
 - (ii) poor administrative controls; (3 marks)
 - (iii) poor engineering controls. (4 marks)

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