



**PROGRAM:** NATIONAL DIPLOMA  
*ENVIRONMENTAL HEALTH*

**SUBJECT:** OCCUPATIONAL HEALTH AND SAFETY III

**CODE:** OHS 32-1

**DATE:** YEAR END EXAMINATION (THEORY)  
15 NOVEMBER 2014

**DURATION:** 3 HOURS

**WEIGHT:** 50:50

**TOTAL MARKS:** 150

---

**EXAMINER:** DR A.T. KUVAREGA

**MODERATOR:** MR F. TAU

**NUMBER OF PAGES:** 6 PAGES

---

**INSTRUCTIONS TO STUDENTS:**

1. ANSWER ALL THE QUESTIONS.
  2. READ THE QUESTIONS CAREFULLY. YOU WILL BE PENALISED IF YOUR ANSWERS ARE NOT PROPERLY STRUCTURED AND NUMBERED.
  3. LEAVE SPACE IN BETWEEN THE ANSWERS.
  4. ONLY SCIENTIFIC CALCULATORS ARE PERMITTED.
-

---

## **SECTION A**

### **QUESTION 1**

- (a) Define the following terms as applied in Occupational Health and Safety.
- i. Hazard [1 Mark]
  - ii. Risk [1 Mark]
  - iii. Dust [1 Mark]
  - iv. Vapour [1 Mark]
  - v. Fibre [1 Mark]
- (b) We use lead (Pb) and lead based products in our daily lives. However, exposure to lead is known to be hazardous. For lead or its compound(s), discuss;
- i. Its occurrence in nature [1 Mark]
  - ii. Two major uses [1 Mark]
  - iii. Common health hazards [2 Marks]
  - iv. Any chronic symptom of exposure [1 Mark]

### **QUESTION 2**

- (a) Define bio-accumulation [2 Marks]
- (b) Using a suitable and relevant simplified diagram, describe the process of bio-accumulation of a named pesticide in the ecosystem, starting with its application on a piece of agricultural land. [8 Marks]

### **QUESTION 3**

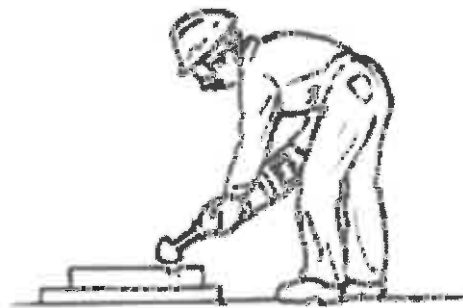
A few decades ago, there were debates and arguments in newspapers, journals, and courtrooms about a pressing question on whether the pesticide dichlorodiphenyltrichloroethane (DDT) should be banned worldwide. To date some countries do not have any binding legal frameworks on the use of DDT. Currently, the

Global Strategy for Malaria Control is the focus of intense discussion on the international arena.

Giving valid reasons, discuss why, in your opinion, the pesticide DDT should not be used for the control of mosquitoes. [10 Marks]

#### **QUESTION 4**

The injuries resulting from manual handling of objects and materials make up a large proportion of all compensable injuries. This problem is of concern to the safety and health professional and represents an area where biomechanical data relating to lifting and carrying can be applied in the work layout and design of jobs that require handling of materials. The diagram below shows a typical example of a situation where ergonomic factors are at play.



- (a) Discuss the major ergonomic factors associated with the job shown above. [7 Marks]
- (b) What improvements may you suggest to reduce the effects? [3 Marks]

#### **QUESTION 5**

There are approximately 200 biological agents, such as infectious microorganisms, biological allergens and hazardous toxins that are known to produce infections or allergenic, toxic, or carcinogenic reactions in workers. Mr Khumalo, a young industrial hygiene professional from Pretoria would like the working population of Inkandla Chemical Company to be better educated as to the use of hazardous toxic substances. In particular, he would like them to be better aware of the routes of entry

for these substances for possible intervention through provision of personal protective equipment (PPE)

- (a) What are the common routes of entry of hazardous substances? [2 Marks]
- (b) Exposures to allergens often lead to dermatitis. Give the two common types of dermatitis? [2 Marks]
- (c) Is the provision of PPEs guaranteed to provide protection against hazardous substances? Justify your answer by discussing the major disadvantages of a named PPE with regards to its effectiveness. [6 Marks]

### **QUESTION 6**

Ngubane Ceramics in Mpumalanga produces a number of ceramic products including ceramic tiles. Although the heavy machinery involved in ceramic production presents its own array of hazards, one particular health hazard endemic to ceramic factories is dust. Modise, the safety manager at the mill, is handling an orientation session with several new employees in the personnel department. It is important for them to understand the potential hazards of exposure to dust.

- (a) Discuss the major hazards associated with exposure to dust? [2 marks]
- (b) In the event of inhalation, the dust will eventually be deposited in the lungs. Describe the main deposition mechanisms in the lungs. [8 Marks]

### **QUESTION 7**

Caroline is a 10 month-old girl who was brought to the pediatric clinic by her mother for an "itchy red rash" which has been troubling her for the last 7 months. The rash waxes and wanes and is even visible on her face. Her mother reports Caroline is bathed daily using a "normal" soap. Sometimes they use moisturising lotion if her skin appears dry. They recently introduced peas into her diet and wonder whether this may be contributing to the rash.

- 
- (a) What is the most likely diagnosis of Caroline's condition? [1 Marks]
- (b) What other details should be provided for a conclusive decision on Caroline's condition? [4 Marks]
- (c) What recommendations would you provide to Caroline's parents? [4 Marks]
- (d) Caroline's parents would also like more information regarding the possible effect of food allergies on Caroline's condition. What can you tell them? [1 Mark]

### **QUESTION 8**

Tetraethyl lead (TEL) is an alkyl (or organic) lead compound  $[(C_2H_5)_4 Pb]$  and is soluble in hydrocarbons. It can be used to raise the octane number of gasoline or petrol to prevent "knocking" in internal combustion engines. The concentration of lead alkyl in gasoline varies but is typically between 0.2 – 0.4 g/L. Petrol attendants are at high risk of exposure to leaded gasoline.

- (a) Describe the possible hazards associated with exposure to leaded gasoline/petrol. [8 Marks]
- (b) Why are most governments changing from leaded to unleaded gasoline? [2 Marks]

### **QUESTION 9**

Using a suitable example, discuss the major elements of risk control from an occupational health and safety perspective. [10 marks]

---

## **SECTION B**

### **QUESTION 10**

Matjie Farm is part of the agribusiness chain. The farmland produces a variety of vegetables that are sold to a conglomerate that processes and distributes the finished product. Certain pesticides and herbicides are necessary to maximise the yield from each acre, but proper handling of these chemicals is important not only for the vegetables, but also for the safety of the farm workers. Khayelihle, an Occupational Health and Safety manager with the farm, makes sure that the workers are carefully instructed on pesticide usage and occasionally monitors the situation.

Discuss the instructions that Khayelihle would provide to the farm workers about pesticide handling and usage from an occupational health and safety point of view.

[20 Marks]

### **QUESTION 11**

Discuss the basic categories of hoods used in local exhaust ventilation (LEV) systems and indicate their application, advantages and limitations.

[20 Marks]

### **QUESTION 12**

A new fertiliser manufacturing company is to be set up on the outskirts of Soweto. It is anticipated that there will be a lot of chemical emissions from the manufacturing processes. You are hired to assist management with setting up the control measures against the emissions. Discuss the elements of the hierarchy of controls that can be instituted in order of their preference.

[20 Marks]

**TOTAL MARKS: 150**