



UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE

BSc DEGREE IN ENVIRONMENTAL HEALTH SCIENCES

RE-SIT EXAMINATION, JULY, 2018

**TITLE OF PAPER : PRINCIPLES OF OCCUPATIONAL HEALTH
AND SAFETY**

COURSE CODE : EHS 218

TIME : 2 HOURS

TOTAL MARKS : 100

INSTRUCTIONS:

- 1. QUESTION 1 IS COMPULSORY**
- 2. ANSWER ANY OTHER THREE QUESTIONS**
- 3. ALL QUESTIONS ARE WORTH 25 MARKS EACH**
- 4. BEGIN THE ANSWER TO EACH QUESTION IN A SEPARATE SHEET OF PAPER.**

DO NO OPEN THIS EXAMINATION PAPER UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

QUESTION 1

I. Multiple choices: For the following statements as applied in principles of occupational health and safety write whether they are True or False.

- i. Dilution Ventilation reduces the concentration of background contamination by the addition of fresh, uncontaminated air
- ii. Dermal absorption is the transport of a chemical from the outer surface of the skin into the skin and into the body.
- iii. The three main routes of entry of toxins into the body are via inhalation, the skin and ingestion.
- iv. Damaged skin does not facilitate absorption of toxins.
- v. Metabolism cannot convert a toxic substance to a non-toxic one.
- vi. The rate of metabolism does not depend on the rate of absorption and the extent of protein-binding
- vii. The more rapidly excretion takes place the less likely is a toxin to damage the body
- viii. Material Safety Data Sheet is a standard way of communicating toxicology and other relevant information about substances..
- ix. Trans-cellular permeation is cell-to-cell
- x. An occupational hazard is defined as a condition that results from exposure in a workplace to a physical, chemical or biological agent to the extent that the normal physiological mechanisms are affected and the health of the worker is impaired
- xi. Toxicology is the study of the adverse effects of substances on living organisms. Industrial toxicology is concerned with the adverse effects on workers of substances handled in the workplace

(22 marks)

II.

Describe the purposes of health surveillance

(3 marks)

QUESTION 2

a) Describe the circulatory system and its importance in occupational health

(5 marks)

- b) With the aid of a diagram describe the Respiratory system and its functions as it relates to occupational health. **(10 marks)**
- c) Describe three mechanisms by which chemicals diffuse into the skin. **(10 marks)**

QUESTION 3

- i. Describe five types of information that the Material Safety Data Sheet is likely to contain. **(13 marks)**
- ii. Describe the occupational disease called silicosis **(7 marks)**
- iii. Prove that doubling the pressure leads to an increase of 6dB in the sound pressure level. **(5 marks)**

QUESTION 4

- a) Describe an effective risk management policy. **(12 marks)**
- b) A reverberant enclosure 20 m long, 4m wide and 3m high, has an average absorption coefficient of 0.21. What is the reverberation time of the enclosure? **(5 marks)**
- c) Describe Local Exhaust Ventilation (LEV) and how it functions. **(8 marks)**

QUESTION 5

- a) Describe sampling for airborne particulates. **(10 marks)**
- b) What are the three reasons for carrying out health surveillance at work? **(3 marks)**
- c) Describe health surveillance in occupation health and safety. **(12 marks)**

FORMULAE

1. $W = \sum_{i=1}^4 p_{2rms}(1)S_i$, where $\rho C = 420$ RAYLS.
2. $L_p = 10 \log (p_1/p_0)^2$
3. $NR = 10 \log_{10} = \frac{TA_2}{TA_1}$
4. $SPL_t = 10 \log_{10} [\sum 10^{SPL/10}]$
5. $L_w = 10 \log W/W_0$
6. $I = \frac{W}{A}$
7. $I = \frac{p_{rms}^2}{\rho C}$ or $p_{rms} = (I \rho C)^{1/2}$
8. S.I.L = $10 \log_{10} (I/I_{ref})$
9. $R = \frac{S\bar{\alpha}}{1-\bar{\alpha}} = \frac{19.8}{1-\bar{\alpha}} = 22.10$
10. $\bar{\alpha} = \frac{S_1\bar{\alpha}_1 + S_2\bar{\alpha}_2 + \dots}{S_1 + S_2}$
11. $SPL_t = SWL + 10 \log_{10} \left\{ \frac{Q}{4\pi r^2} + \frac{4}{R} \right\}$
12. $T = \frac{0.161 V}{S\bar{\alpha}}$
13. $T = \frac{0.161 V}{-S[\ln(1-\bar{\alpha})] + 4mV}$
14. $\tau = \frac{p_t^2/\rho C^2}{p_i^2/\rho C^2}$
15. $TL_{brick} = 10 \log_{10} \left\{ \frac{1}{\tau} \right\}$
16. $[C_1 T_1 + C_2 T_2 \dots C_n T_n] / 8$