UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE

BSc DEGREE IN ENVIRONMENTAL HEALTH SCIENCES

MAIN EXAMINATION, MAY, 2019

TITLE OF PAPER   : PRINCIPLES OF OCCUPATIONAL HEALTH AND SAFETY

COURSE CODE   : EHS218

TIME   : 2HOURS

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.

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QUESTION 1

I. **Multiple choices: For the following statements as applied in principles of occupationalhealth 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 absorptionis 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 iscell-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) With the aid of a diagram describe the fundamental components that are common to all local exhaust ventilation systems.

(10 marks)

QUESTION 3

i. Describe four types of informationthat the Material Safety Data Sheet is likely to contain.

(12 marks)

ii. Describe the occupational disease called silicosis

(7 marks)

iii. Prove that doubling the pressure leads to an increase of6dB in the sound pressure level.

(6 marks)

QUESTION 4

a) Describe three mechanisms by which chemicals diffuse into the skin.

(6 marks)

b) Describe Local Exhaust Ventilation (LEV) and how it functions.

(6 marks)

c) With the aid of diagrams, describe *an enclosing hood.*

(5 marks)

d) The Table below shows industrial processes; fill in the blank spaces under nature of hazardous substance and types of LEV

(8 marks)

Industrial process	Nature of hazardous substance	Types of LEV
\Welding		
Paint spraying		
Polishing		
Shot blasting		

QUESTION 5

a) Describe the main effects of welding fumes.

(12 marks)

b) Differentiate between total inhalable dust and respirable dust

(4 marks)

c) Describe an effective risk management policy.

(9 marks)

FORMULAE

1. $W = \sum\limits_{i=1}^{4} \dfrac{p2rms(1)Si}{\rho C}$, where $\rho C = 420$ RAYLS.

2. $L_p = 10 \log (p_1/p_0)^2$

3. $NR = 10 \log_{10} = \dfrac{TA_2}{TA_1}$

4. $SPL_t = 10 \log_{10} [\sum 10^{SPL/10}]$

5. $L_W = 10 \log W/W_0$

6. $I = \dfrac{W}{A}$

7. $I = \dfrac{p^2_{rms}}{\rho C}$ or $p_{rms} = (I \rho C)^{1/2}$

8. $S.I.L = 10 \log_{10} (I/I_{ref})$

9. $R = \dfrac{S\bar{\alpha}}{1-\bar{\alpha}} = \dfrac{19.8}{} = 22.10$

10. $\bar{\alpha} = \dfrac{S_i\bar{\alpha}_i + S_2 \bar{\alpha}_2 + \dots}{S_i + S_2}$

11. $SPL_t = SWL + 10 \log_{10} \{ \dfrac{Q}{4\pi r^2} + \dfrac{4}{R}\}$

12. $T = \dfrac{0.161 \, V}{S\bar{\alpha}}$

13. $T = \dfrac{0.161 \, V}{- S[\ln (1- \bar{\alpha})] + 4mV}$

14. $\tau = \dfrac{p_t^2/\rho C^2}{p_i^2/\rho C^2}$

15. $TL_{brick} = 10 \log_{10}\{\dfrac{1}{\tau}\}$

16. $[C_1 T_1 + C_2T_2 \text{-------} C_nT_n]/ 8$