UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE

BSc DEGREE IN ENVIRONMENTAL HEALTH SCIENCES

MAIN EXAMINATION, MAY, 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.

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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. Health Surveillance is a generic term which includes any procedure undertaken to assess, review or monitor an individual's health in order to identify or detect any significant change from normality.

   ii. The timing of biological monitoring will not depend on the expected absorption, metabolism and excretion rates and the known half-life of the substance in question.

   iii. With scrupulous sampling techniques, analysis and quality control, biological monitoring can show up susceptible individuals, uptake within or outside acceptable levels and high exposure groups of people who may have been missed by environmental monitoring.

   iv. Risk assessment is the prediction of the toxic effects that will be evident under defined conditions of exposure.

   v. Toxicology is a discipline which makes use of information developed by a wide range of chemical, physical, biological and medical sciences in order to predict the likely adverse effects on man of an ever-increasing range of substances to which he is exposed.

   vi. Hazard assessment is the prediction of the probability that defined toxic effects will occur under defined conditions of exposure in a single person or a defined population.

   vii. Exposure to high atmospheric concentrations of methylene chloride vapour depresses the nervous system (narcosis), causes heart arrhythmias and liver and kidney damage.

   viii. In general high doses/exposures given over long periods do not produce a wider range and more intense toxic effects than low doses/exposures given over short periods.

   ix. The toxic effects of a substance depend upon: its physical form, the dose, the route of entry, its absorption, distribution, metabolism and excretion.

     x.   Silicosis is a pulmonary fibrosis which is regarded as the most common and severe of all pneumoconioses.

    xi.   Occupational hazards can encompass many types of hazards, including chemical hazards, biological hazards (biohazards), psychosocial hazards, and physical hazards.

(22 marks)

II.

Define occupational hygiene.

(3 marks)

QUESTION 2

a) With the aid of a diagram describe the skin and its functions

(7 marks)

b) Describe chemical asphyxia in relation to respiratory exposure at work.

(6 marks)

c) Describe the main effects of welding fumes.

(12 marks)

QUESTION 3

    i.   Differentiate between total inhalable dust and respirable dust

(4 marks)

    ii.   Describe the occupational disease called pneumoconiosis:

(7 marks)

    iii.   Prove that doubling the power leads to an increase of 3dB in the sound power level.

(5 marks)

    iv   With the aid of a diagram describe the fundamental components that are common to all local exhaust ventilation systems.

(9 marks)

QUESTION 4

a) Describe the main types of sampling

(10 marks)

b) A reverberant enclosure 15 m long, 5m wide and 3m high, has an average absorption coefficient of 0.18. What is the reverberation time of the enclosure?

(5 marks)

c) Define the following terms as applied in occupational health safety

    i.   Mist

    ii.   Fume

    iii.   Dust

    iv.   Aerosol

    v.   Fibre

(10 marks)

QUESTION 5

a) With the aid of diagrams, describe the three types of inlets/hoods of a Local Exhaust Ventilation (LEV) system.

(15 marks)

b) What do biological measurements meant to determine?

(5 marks)

c) Describe Lung function tests

(5 marks)

FORMULAE- ACOUSTIC AND HEALTH

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

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

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

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

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

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. $[C_1 T_1 + C_2 T_2 \text{-------} C_n T_n]/8$