UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
Department of Environmental Health Science

DEGREE IN ENVIRONMENTAL HEALTH SCIENCES

FINAL EXAMINATION PAPER 2016

TITLE OF PAPER	:	PRINCIPLES OF OCCUPATIONAL HEALTH AND SAFETY
COURSE CODE	:	EHM 211
DURATION	:	2 HOURS
MARKS	:	100
INSTRUCTIONS	:	READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
	:	QUESTION 1 IS COMPULSORY
		ANSWER **ANY OTHER THREE** QUESTIONS
	:	EACH QUESTION **CARRIES 25** MARKS.
	:	WRITE NEATLY & CLEARLY
	:	NO PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM.
	:	BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

QUESTION 1

I.

For the following statements as applied in principles of occupational, health and safety write whether they are true or false.

a) An occupational hazard is a risk accepted as a consequence of a particular occupation
b) Occupational illness 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.
c) Occupational hazards include risk of accident and of contracting occupational diseases.
d) Threshold limit value (TLV) refers to airborne concentration of a substance and represents conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects.
e) Thresholds limit value for fumes, mists, and dusts as milligrams per cubic meter (mg/m3) of surrounding air.
f) Threshold value-time weighted average is the time weighted concentration for a normal 8-hour workday and a 40-hour workweek, to which it is believed that nearly all the workers may be repeatedly exposed day after day, without adverse health effect.
g) Threshold value- short term exposure limits the maximum concentration of a substance to which it is believed that nearly all the workers can be exposed continuously for a short period of time, without suffering irritation; chronic or irreversible tissue damage or narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue or materially reduce work efficiency
h) threshold limit value ceiling - exposure limit or maximum exposure concentration that should not be exceeded under any circumstance, while meeting the daily TLV-TWA.
i) Skin Notation designated "Skin" refers to the potential significant contribution to the overall exposure by the cutaneous route.
j) Dermal exposure can result in occupational skin diseases and systemic toxicity.

[20 marks]

II.

If a pure tone acoustic wave has a S.I.L of 90 dB what is the peak value of acoustic pressure?

[5 marks]

QUESTION 2

i. Describe skin hazards

[6 marks]

ii. Describe dermal absorption of chemicals.

[15 marks]

iii. Define the word ergonomics as it is applied in occupational health and safety

[4 marks]

QUESTION 3

i. A reverberant enclosure 8m long, 5m wide and 3m high, has an average absorption coefficient of 0.02. What is the reverberation time of the enclosure?

[3 marks]

ii. Describe three mechanisms by which chemicals diffuse into the skin.

[9 marks]

iii. A sound source emits 1watt of power, calculate the sound power level.

[7 marks]

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

[6 marks]

QUESTION 4

a) With the aid of a diagram describe the anatomy and physiology of the skin and occupational disease that may affect it.

[8 marks]

b) Name two ways to reduce the dose of a harmful agent or energy

[2 marks]

c) Describe five dose reduction methods used to prevent occupational disease.

[15 marks]

QUESTION 5

a) Name two types of chemical agents responsible for causing occupational skin disease and disorders.

[2 marks]

b) Briefly describe how a workers skin may be exposed to chemical hazards.

[4 marks]

c) Describe five physical hazards and their likely effects on worker's health if exposed to them.

[10 marks]

d) Describe three risk factors associated with musculoskeletal injuries and illnesses

[9 marks]

FORMULAE- ACOUSTIC AND HEALTH

1. $W = \sum\limits_{i=1}^{4} \dfrac{p^{2rms(1)}S_i}{\rho C}$, 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. $R = \dfrac{S\bar{\alpha}}{1-\bar{\alpha}} = \dfrac{19.8}{1} = 22.10$

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