



UNIVERSITY OF SWAZILAND  
FACULTY OF HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE

BACHELOR OF SCIENCE IN ENVIRONMENTMANAGEMENT &  
OCCUPATIONAL HEALTH

MAY 2018 MAIN EXAMINATION PAPER

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TITLE OF PAPER : FUNDAMENTALS OF INDUSTRIAL HYGIENE  
COURSE CODE : EHM 428  
DURATION : 2 HOURS  
MARKS : 100

#### INSTRUCTIONS

1. Read the questions & instructions carefully
2. Question 1 is compulsory
3. Then answer ANY THREE (3) questions
4. Each question is weighted 25 marks
5. Write neatly and clearly
6. Numbering within a chosen question should be in a sequential order
7. BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

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

**QUESTION 1**

- a) The following statements are either True or False. Indicate the correct answer by either writing T or F. Each question is worth 1 mark (10 marks).
- i. Water vapour is adsorbed by anhydrous chloride
  - ii. Calcium chloride is absorbed by silica gel
  - iii. Positive adsorption is where there is less concentration of Adsorbate at the surface of the adsorbent than that in the bulk.
  - iv. Adsorption is the phenomenon of high concentration of a solute on the surface than in the bulk of the solid.
  - v. Negative adsorption is when there is more concentration on the surface than in the bulk of the solid.
  - vi. Interface is the common surface between the Adsorbate and the adsorbate.
  - vii. Adsorption is a surface phenomenon.
  - viii. Adsorbate is a substance which is taken up on the surface.
  - ix. Adsorbent is the substance upon whose surface the change of concentration occurs.
  - x. Absorption is the increase in concentration of a liquid brought about by the action of molecular surface forces.
- b) For the following questions choose the most appropriate response(s) that best answers the question.
- i. What two factors determine risk, when dealing with a chemical hazard in the workplace? (2 marks)
    - a. Volatility of chemical and age of worker
    - b. Reactivity of chemical and equipment speed
    - c. Toxicity of chemical and duration of exposure
  - ii. Which of the following would be considered a workplace hazard? - Check all that apply (4 marks)
    - a. Toluene vapours
    - b. Floor mat
    - c. Fungi
    - d. Extreme heat
    - e. Exit sign
    - f. Repetitive motion
  - iii. An industrial hygienist can rely on a Material Safety Datasheet for which of the following? (2 marks).
    - a. Chemical constituent and concentration values
    - b. Regulatory compliance data
    - c. Chemical reactivity values

iv. It is the responsibility of the manufacturer to calibrate sampling equipment used by industrial hygienists (1mark).

- True
- False

v. OSHA requires that employers conduct exposure assessments (1mark).

- True
- False

vi. ACGIH provides which of the following information? Check all that apply (3)

- A. Threshold Limit Values (TLVs)
- B. Recommended Exposure Limits (RELs)
- C. Biological Exposure Indices (BEIs)
- D. Carcinogenic data

vii. NIOSH acts a research organization to provide OSHA with data to help prevent workplace accidents, injuries and illnesses (1mark).

- True
- False

viii. Chemical hazards in the workplace are often the most complex hazards to implement proper controls on due to the multitude of variables that affect the situation (1mark).

- True
- False

**TOTAL MARKS 25**

**QUESTION 2**

- a) What are the 2 design features that Self Contained Breathing Apparatus for fire fighting are dependent on, and why are they more expensive compared to other types? (6 marks)
- b) What is the acceptable time lapse allowed before fire rescuers can manually rescue one of their own? (2 mark)
- c) Outline the health effects associated with each of the following type of noise.
  - Temporary Threshold Shift (TTS) (4marks)
  - Annoyance/stress (4marks)
  - Tinnitus - Noise heard in the ear without external cause, frequently accompanies deafness (4marks)

- d) If you were to carry out biological measurements to workers on skin, and vision, what indicators will you be looking for? (5 marks)

**TOTAL MARKS 25**

**QUESTION 3**

- a) What type of environments are the following:
- i) Oxygen deficient and;
  - ii) Oxygen enriched including their percentage ranges? (4marks)
- b) Define a fit test. (3 marks)
- c) Define an IDHL atmosphere. (3 marks)
- d) Explain briefly what the following terms mean; (12 marks)
- i. Lower exposure action values.
  - ii. Upper exposure action values.
  - iii. Exposures limit values.
- e) Define the United of States 5dB doubling concept. (2 marks)
- f) Define quantity as it relates to lighting in the workplace. (1mark)

**TOTAL MARKS 25**

**QUESTION 4**

- a) Outline the factors that may influence heat balance in the workplace and indicate how they do so? (4marks)
- b) If you were to quantify exposure, what would be the 3 key parameters you will take into account? (6 marks)
- c) Define the following terms used under OELs? (6 marks)
- i. Regulatory standard
  - ii. Voluntary guidelines
  - iii. "Local limits"
- d) Workers are able to transfer heat from themselves to the general environment. Write the formula for heat transfer and indicate what each parameter stands for. (7 marks)
- e) What is meant by cartridge saturation? (2 marks)

**TOTAL MARKS 25**

**QUESTION 5**

- a) If you were carrying out air sampling in the workplace, you would consider where to sample. What factors should be considered? (8 marks).
- b) How does a Tyndal Beam Light Effect function and its limitation? (10 marks)
- c) How is a positive fit test carried out and what is its limitation? (6 marks)
- d) Why are respirators worn 5 minutes before the actual fit testing exercise is carried out? (1mark).

**TOTAL MARKS 25**