MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF BACHELOR OF SCIENCE (PUBLIC HEALTH)

BEVH 1105: LABORATORY METHODS FOR ENVIRONMENTAL HEALTH

DATE: 9/5/2019 **TIME: 8.30-10.30 AM**

INSTRUCTIONS TO CANDIDATES

- The paper consists of **two** sections.
- Section **A** is **compulsory**.
- Answer any **two** questions from section **B**.

SECTION A – COMPULSORY (30 MARKS)

QUESTION ONE (30 MARKS)

a) Differentiate between the following: (4 marks)

   i) Chemical safety and chemical security

   ii) Acids and bases

b) Discuss any four personal protective equipment (PPE) and their purpose. (4 marks)

c) Provide two reasons why chemical safety and chemical security are important (2 marks)

d) Solution A has a hydronium ion concentration of 3.8×10^{-8} M, while solution B has a hydronium ion concentration of 2.5×10^{-4} M. (6 marks)

   i) Which solution has a higher hydronium ion concentration?

   ii) Calculate the pH of the two solutions.

   iii) Calculate the pOH of the two solutions

e) Derive Henderson-Hasselbalch equation and calculate the pH of the following buffer solutions (9 marks)

i) 50.0 mL of 0.10M HF and 50.0 mL of 0.10M NaF. K_a for HF = 7.1×10^{-4}

ii) 40.0 mL of 0.10 HNO_2 and 60.0 mL of 0.10 M $NaNO_2$. K_a for HNO_2 = 4.5×10^{-4}

f) List six fundamental rules of chemical laboratory safety. (3 marks)

g) Provide the main difference between Mohr and Serological pipette. (2 marks)

SECTION B-ANSWER ANY TWO QUESTIONS

QUESTION TWO (20 MARKS)

a) Define risk assessment and discuss the importance of risk assessment (3 marks)

b) Discuss the steps involved in risk assessment (8 marks)

c) Define the term buffer solution and show how a buffer solution can be prepared in the laboratory using a practical example. (5 marks)

d) Discuss the mechanism by which buffer solutions work. (2 marks)

e) List four intermolecular forces that affect solubility when preparing solutions (2 marks)

QUESTION THREE (20 MARKS)

a) Define an hazard and identify three hazards in the laboratory (4 marks)

b) Discuss the contents of a spill kit and why it is a necessity in the laboratory (5 marks)

c) Discuss important considerations when collecting, transporting and storing specimen. (6 marks)

d) Describe how volumetric flasks and pipettes are calibrated (5 marks)

QUESTION FOUR (20 MARKS)

a) Explain four main conflicts between chemical safety and security (8 marks)

b) Discuss what must be considered when cleaning laboratory glassware (6 marks)

c) Discuss the classification of errors and how they affect laboratory measurements (6 marks)

QUESTION FIVE (20 MARKS)

a) Define safety data sheet (SDS) and discuss any four contents of a safety data sheet (MSDS) (5 marks)

b) Discuss the seven main components of a laboratory report (7 marks)

c) Explain the terms; mixture, solution and solvent. (6 marks)

d) Discuss how cryogenics should be handled (2 marks)