



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

FIRST YEAR FIRST SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE (ANALYTICAL CHEMISTRY)

SAN100: CHEMICAL SAFETY AND SECURITY

DATE: 27/1/2022

TIME: 2.00-4.00 PM

INSTRUCTIONS:

- The paper consists of **two** sections.
- Section **A** is **compulsory** (30 marks).
- Answer any **two** questions from section **B** (each 20 marks).

SECTION A - COMPULSORY. (30 MARKS)

QUESTION ONE (30 MARKS)

- a) Explain the following terms:
- Chemical safety (1 mark)
 - Chemical security (1 mark)
 - Dual-use chemical (1 mark)
 - Chemicals of concern (1 mark)
- b) State:
- The objective of chemical safety controls (1 mark)
 - The objective of chemical security controls (1 mark)
- c) State four main expectations of a chemical practitioner in promoting global code of ethics (4 marks)
- d) Name any four chemicals that have dual-use. (2 marks)
- e) i. What is a risk analysis framework? (2 marks)
- ii. The risk analysis framework is developed on three interconnected elements. State and briefly explain each of the elements. (6 marks)
- f) Briefly explain the **Five** pillars that are employed in chemical security risk assessment program. (10 marks)

QUESTION TWO (20 MARKS)

- a) Briefly explain what is the meaning of a good laboratory practice (GLP) (3 marks)
- b) State the importance of good laboratory practices (4 marks)
- c) List the four basic elements of a good laboratory practice regime and give two (2) examples for each element. (6 marks)
- d) Identify and explain ANY seven roles of GLP in chemical security (7 marks)

QUESTION THREE (20 MARKS)

- a) Define the following terms:
 - i. Hazard (1 mark)
 - ii. Risk (1 mark)
- b) Identify four laboratory hazards and give two examples for each (8 marks)
- c) State the two classes of chemical toxicity and for each give an example of the possible cause. (4 marks)
- d) State six laboratory safety policies (6 marks)

QUESTION FOUR (20 MARKS)

- a) Explain four main conflicts between safety and security (8 marks)
- b) Describe the constitution of a good physical protection system (3 marks)
- c) Discuss the three critical factors for physical protection system design (9 marks)

QUESTION FIVE (20 MARKS)

- a) **State the meaning** and **explain the purpose** of globally harmonized system. (3 marks)
- b) State ANY Five benefits brought about by the globally harmonized system (5 marks)
- c) Name the classes of hazards addressed by the globally harmonized system (3 marks)
- d) For **EACH** of the classes in Q5 c) above, state **any three** specific examples (9 marks)