CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE AND BACHELOR OF EDUCATION (SCIENCE)

CHEM 101: CHEMICAL LABORATORY SAFETY AND SECURITY

SREAMS: BED (SCI), BSC **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 11/12/2019 **11.30 A.M. – 1.30 P.M.**

INSTRUCTIONS: Answer question ONE and any other TWO questions

QUESTION ONE (30 MARKS)

(a) Define the following terms as used in the classification of flammable chemicals (3 marks)

i. Flash point
ii. Boiling point
iii. Auto-ignition temperature

(b) Explain how the following equipments are used in the laboratory to provide safety (6 marks)

i. Fume hood
ii. Safety showers and eye wash stations
iii. Biological safety cabinets

(c) Highlight the general rules for maintaining a safe laboratory environment (4 marks)

(d) Briefly describe 3 principles of green chemistry that can be applied in a laboratory (6 marks)

(e) Elaborate three safety techniques when handling equipment that use high current or high voltage (3 marks)

(f) State four stirring and mixing devices found in the laboratories (2 marks)

(g) Outline three precautions to take when handling glass containers (3 marks)

(h) Discuss three options to consider in case there is power loss in a laboratory (3 marks)

QUESTION TWO (20 MARKS)

(a) Discuss the various laboratory disposal options (6 marks)

(b) Describe the following types of laboratory chemicals (6 marks)

i. Flammable chemicals

ii. Reactive chemicals

iii. Explosive chemicals

(c) Explain the major phases to managing a large-scale emergency (4 marks)

(d) Describe the general guidelines to prevent and reduce injury and damages from fire (4 marks)

QUESTION THREE (20 MARKS)

(a) Briefly explain the potential hazards arising from the following; (4 marks)

i. Radioactivity in a laboratory setting

ii. Nanomaterials

(b) Explain 3 causes of ignition (6 marks)

(c) Briefly explain the information found in a material safety data sheets (MSDSs) (5 marks)

(d) Differentiate between chronic and acute exposure of chemicals (2 marks)

(e) Explain the dose response curve (3 marks)

QUESTION FOUR (20 MARKS)

(a) Explain the following type of chemicals (4 marks)

i. Irritants

ii. Corrosive substances

iii. Neurotoxins

iv. Carcinogens

(b) Explain the guidelines of cleaning up the following types of spills (2 marks)

i. Materials of low flammability that are not volatile or that have low toxicity

ii. Flammable solvents

(c) Briefly discuss the properties of hazardous wastes (6 marks)

(d) Discuss the four (4) classes of fires common in the laboratory stating the type of extinguisher that can be used for each (8 marks)
