THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

A. M. E. C. E. A

P.O. Box 62157
00200 Nairobi - KENYA
Telephone: 891601-6
Fax: 254-20-891084
E-mail:academics@cuea.edu

MAIN EXAMINATION

AUGUST – DECEMBER 2018 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF NATURAL SCIENCE (CHEMISTRY)

CHEM 202: NUCLEAR AND RADIATION CHEMISTRY

Date: DECEMBER 2018	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions	

Q1. a) i) Define the term radioactivity. **(2 marks)**

   ii) Using relevant examples an Nuclear equation explain the factors that influence the stability of a nucleus. **(10 marks)**

b) i) Define atomic mass unit. **(2 marks)**

   ii) Show how 1 amu is converted into energy in MeV. **(6 marks)**

c) Using a relevant diagram describe the forces that binds the nucleus together. **(10 marks)**

Q2. a) A sample of radioactive material contains 2×10^{10} atoms. The half-life of the material is 4-days. Calculate
   i) The fraction remaining after 9 days. **(5 marks)**
   ii) The activity of the sample after 9 days. **(5 marks)**

b) i) What is neutron activation analysis? **(4 marks)**
   ii) Explain the principles behind caron-14 dating technique.
   (6 marks)

Q3. a) i) What is radiochemistry? **(4 marks)**
   ii) Describe how radioactivity is used in the following cases
      - Agriculture
      - Biology
      - Medicine

ISO 9001:2008 Certified by the Kenya Bureau of Standards

		- Water technology	**(12 marks)**

b) Define radioactive equilibrium. **(4 marks)**

Q4. a) Show that the activity of a radioactive sample is given by $A = A_0 \, e^{-\lambda t}$ and define all the terms. **(10 marks)**

b) Give two types of nuclear fuel and for each state how it is obtained. **(10 marks)**

Q5. a) Discuss the factors that influence the biological effect of a particular source of radiation. **(8 marks)**

b) Explain the mechanisms of Fe^{++} dosimeter. **(8 marks)**

c) List 4 types of radioactive decay series and for each state the initial and final product. **(4 marks)**

END

ISO 9001:2008 Certified by the Kenya Bureau of Standards