



**MASENO UNIVERSITY**  
**UNIVERSITY EXAMINATIONS 2013/2014**

**FOURTH YEAR SECOND SEMESTER EXAMINATIONS FOR THE  
DEGREE OF BACHELOR OF SCIENCE IN MEDICAL  
BIOTECHNOLOGY WITH INFORMATION TECHNOLOGY  
(MAIN CAMPUS)**

**PMB 445: RADIOBIOLOGY AND RADIONUCLIDES**

Date: 3<sup>rd</sup> April, 2014

Time: 2.45 – 5.00 p.m.

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**BSc MEDICAL BIOTECHNOLOGY  
PMB 445: RADIOBIOLOGY AND RADIONUCLIDES  
YEAR 4 SEM 2; 2014 FINAL EXAMS**

**SECTION I**

**Answer ALL Questions (40 marks).**

1. Using known examples, define the following terms (3 marks)
  - a) Isotope
  - b) Isotone
  - c) Excited state of a nuclide
2. Differentiate between Induced and Spontaneous nuclear transformations (3 marks)
3. Differentiate between the Curie and the Becquerel as units in measurement of radioactivity (3 marks)
4. Briefly explain three important conservation laws in radioactive processes or nuclear transformations (3 marks)
5. Using specific examples explain the differences between an alpha particle emission, negatron emission, positron emission and gamma emission ( 6 marks)
6. What do you understand by the term "Exponential Law of Decay" (4 marks)
7. Briefly explain the differences between Average half-life of a radionuclide, Biological half-life of a radionuclide and Effective half-life of a radionuclide (3 marks)
8. Differentiate between "Radiation absorbed dose" and "Radiation dose rate (4 marks)
9. Briefly explain how a thermo-luminescent dosimeter (TLD) works and its applications in radiobiology and nuclear medicine (4 marks)
10. List seven (7) of the twelve (12) safety precautions that laboratory personnel working with radioisotopes MUST take (7 marks)

**SECTION II (30 Marks)**

**Answer Question 11 and either Question 12 OR Question 13**

11. discuss the principles of "Radio-immunoassays" and "Liquid Scintillation counting" as used in the measurement of steroid hormones in plasma (16 marks)
12. Discuss Biological effects of Radiation under the following headings (14 marks)
  - a) Mechanism of biological damage
  - b) Factors affecting biological damage
  - c) Deleterious effects in man
  - d) Radiation effects in a fetus
13. Discuss the procedures used in labeling and analysis of proteins in cell cultures (14 marks)