



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN MEDICAL ENGINEERING

ECL 4101: MEDICAL PHYSICS I.

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions.

Attempt question **ONE (COMPULSARY)** and any other **TWO** questions.

Do not write on the question paper.

Question ONE (30Marks)

(a). Define the following terms.

(i) Isotope (1mk)

(ii) Mass number (1mk)

(iii) Atomic number (1mk)

(b) Describe the structure of an atom. (3mks)

(c) What is the meaning of the following terms

(i) Electronegativity (1mk)

(ii) Electro positivity (1mk)

(d) (i) Define Dosimetry (1mk)

(ii) State any three outcomes of irradiated cells (3mks)

(iii) State any two genetic effects radiation (2mks)

(e) State any two characteristics of acute radiation effects (2mks)

- (f) Give two examples for Ionizing and Non-Ionizing radiations (4mks)
- (g) (i) State three adverse effects of Ultraviolet (3mks)
- (ii) Highlight two adverse effects of visible light (2mks)
- (iii) What is the difference between radio protectors and radio sensitizers (2mks)
- (h) i. State three examples of deterministic effects of radiation (3mks)

Question TWO (20Marks)

- (a) State the three types of radiation therapy (3mks)
- (b) Explain the somatic and genetic effects of radiation, giving examples (6mks)
- (c) Explain the three fractionation schemes of improving therapeutic ratio (6mks)
- (d) Explain the effects of x-rays during pregnancy (5mks)

Question THREE (20Marks)

- (a) Explain the production and specific uses of any four medical radioisotopes (12mks)
- (b) State four characteristics of target material of a reactor in radionuclide production (4mks)
- (c) Explain direct and indirect damage by radiation to biological system (4mks)

Question FOUR (20Marks)

- (a). Explain the five Rs of radiotherapy (10mks)
- (b). Explain the following terms
- I. Stochastic effects (2mks)
- II. Deterministic effects (2mks)
- (c). Explain the Acute and Chronic effects of radiation, giving two characteristics of each (6mks)

Question FIVE (20Marks)

- (a) Describe the Rutherford atomic model, stating its limitations (5mks)
- (b) Explain the meaning of the following terms as used in radioactivity
- I. Activity (2mks)
- II. Specific activity (1mk)

- (c) State and explain the three naturally occurring radiation (6mks)
- (d) I. State two differences between alkali metals and halogens, giving examples of each (4mks)
II. What is the meaning of the following terms.
- (i) Valence electrons (1mk)
 - (ii) Nuclear Fusion (1mk)