



UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

FOURTH BPHARM PART II EXAMINATION – JUNE 2018

PH 4241 RADIO PHARMACY (SEQ)

TIME: TWO HOURS

INSTRUCTIONS

- Answer all **four (04)** questions in the booklet provided.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

01.

- 1.1. Define the term radioisotope. (10 marks)
- 1.2. State **four** parameters to be considered when selecting a radioisotope for diagnosis or therapy? (12 marks)
- 1.3. List **five** applications in medicine where radioisotopes are used. (15 marks)
- 1.4. What is meant by 1 Gy absorbed radiation dose. (14 marks)
- 1.5. Write **three** advantages and **three** disadvantages of Thermoluminescent dosimeter (TLD). (24 marks)
- 1.6. How do you decontaminate the working area of Laminar Air Flow (LAF) cabinet? (15 marks)
- 1.7. List **four** examples of solid waste generation in a nuclear medicine department. (10 marks)

02. Alpha ( $\alpha$ ) particle emitters are used in some smoke alarms. The detector operates due to ionization caused by the particles in the space between the source and the sensor.

- 2.1 Define the term  $\alpha$  particle. (15 marks)
- 2.2 Briefly explain the above mentioned ionization process. (15 marks)
- 2.3 Giving reasons, state whether the half-life of above  $\alpha$  source is long or short. (15 marks)
- 2.4 State the reason for using an  $\alpha$  source instead of a  $\beta$  source or a  $\delta$  source? (15 marks)
- 2.5 What is meant by the “activity” of a radiation source? (10 marks)
- 2.6 State **two** units of radioactivity and give the relationship between them. (15 marks)
- 2.7 List **three** types of forces act in the nucleus of an atom? (15 marks)

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03.

- 3.1 Is  $^{99}\text{Mo}$  artificially produced by a nuclear reactor or a cyclotron? (05 marks)
- 3.2 Write down the decay process of  $^{99}\text{Mo}$ . (10 marks)
- 3.3 Give **five** reasons for using  $^{99\text{m}}\text{Tc}$  radioisotope mostly in nuclear imaging studies. (20 marks)
- 3.4 Sketch the activity- time graph for decaying  $^{99\text{m}}\text{Tc}$  isotope representing the half-lives. (15 marks)
- 3.5 Briefly explain the difference between contamination and irradiation? (20 marks)
- 3.6 If the radioactivity of a  $^{99\text{m}}\text{Tc}$  vial (half-life 6 hours) is 600 MBq, at 10.00 am, calculate the activity of  $^{99\text{m}}\text{Tc}$  vial on the same day.
- 3.6.1 At 8.00 a.m. (15 marks)
- 3.6.2 At 2.00 p.m. (15 marks)

04.

- 4.1 Define the term "Radiation intensity". (15 marks)
- 4.2 How does the intensity vary with distance in a medium when there is no scattering and no absorption? (10 marks)
- 4.3 Briefly explain the **three** types of DNA damage by ionizing radiation. (30 marks)
- 4.4 If the absorbed dose rate at 2 m distance from a gamma ray source in air is 50 cGy/hour, find the following dose rates at 0.5 m and 5 m distances.
- 4.4.1 Absorbed dose rate. (15 marks)
- 4.4.2 Equivalent dose rate. (10 marks)
- 4.5 Briefly explain the direct and indirect actions of ionizing radiation on human cells. (20 marks)

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