



**UNIVERSITY OF RUHUNA – FACULTY OF MEDICINE**  
**ALLIED HEALTH SCIENCES DEGREE PROGRAMME**  
**FOURTH BPHARM PART II EXAMINATION – JUNE 2017**  
**PH 4241 RADIOPHARMACY (SEQ)**

**TWO HOURS**

**INSTRUCTIONS**

- Answer **all** questions.
- Do not use any correction fluid.
- Answer questions in the given answer book.
- Marks will be deducted for illegible hand writing.

1. Answer all parts.

- 1.1. What is meant by radiopharmacy? (15 marks)
- 1.2. Define the physical half-life of a radioisotope. (15 marks)
- 1.3. What is effective half-life of a radioisotope and how it relates to physical half-life? (20 marks)
- 1.4. Write down the equation to calculate the activity after time  $t$  and explain the meaning of each of its terms. (15 marks)
- 1.5. How does the half-life relate to decay factor ( $\lambda$ ) and mean life? (15 marks)
- 1.6. The half-life of  $^{99m}\text{Tc}$  is 6 hours. How much activity remains in the vial at the time of usage if the time interval between elution and use is 05 hours duration and the elute activity is 400 MBq? (20 marks)

2. Answer all parts.

- 2.1. Explain the transient equilibrium of a radioisotope using the time activity graph. Which isotope may undergo transient equilibrium? (20 marks)
- 2.2. Discuss briefly the advantages of radionuclide generators. (20 marks)
- 2.3. If  $^{99m}\text{Tc}$  165 mCi are present on the column of a  $^{99}\text{Mo}/^{99m}\text{Tc}$  generator and following  $^{99m}\text{Tc}$  elution of 145 mCi are assayed in the elution vial, calculate the elution efficiency of the generator? (10 marks)
- 2.4. Give **five** desirable properties of  $^{99m}\text{Tc}$  in nuclear imaging. (10 marks)
- 2.5. List **two** advantages and **two** disadvantages of radiopharmaceuticals in nuclear imaging. (20 marks)
- 2.6. Name **four** radionuclides with their half lives, which can be produced in a cyclotron machine. (20 marks)

3. Answer all parts.

- 3.1. Define the following terms in a tissue or organ of the body and state their units.
  - (i) Absorbed dose (15 marks)
  - (ii) Equivalent dose (15 marks)
- 3.2. Give **two** examples each for directly ionizing and indirectly ionizing radiations. (10 marks)

- 3.3. Briefly explain what is meant by external radiation hazards. (10 marks)
- 3.4. List basic methods to control the external radiation hazards. (10 marks)
- 3.5. Briefly explain the method of skin decontamination. (20 marks)
- 3.6. What items should be included in the emergency kit regards to radiation protection in an iodine therapy unit? (20 marks)

4. Answer all parts.

- 4.1. List **three** fundamental principles of radiation protection and briefly explain them. (15 marks)
- 4.2. Write down the recommended whole body annual dose limits for occupational and public exposure. (10 marks)
- 4.3. Giving an example of each briefly describe the stochastic effect and deterministic effect. (20 marks)
- 4.4. List radiation safety guidelines to be followed when entering to a radiopharmaceutical laboratory. (20 marks)
- 4.5. Briefly explain **two** devices that can be used for personal radiation monitoring. (20 marks)
- 4.6. Explain **three** basic methods for disposing radioactive waste in the department. (15 marks)

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