



UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

FOURTH BPHARM PART II EXAMINATION – OCTOBER/NOVEMBER 2022

PH 4241 RADIO PHARMACY – SEQ

TIME: TWO HOURS

INSTRUCTIONS

- There are **four** questions in this SEQ paper.
- Answer all questions.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

01.

- 1.1. What are radiopharmaceuticals? **(15 marks)**
- 1.2. Define the term “physical half-life” of a radioisotope. **(15 marks)**
- 1.3. Write the equation to calculate the activity of a radioactive source after time “t”. **(10 marks)**
- 1.4. Physical half-life of sodium iodide (^{131}I) is 8 days and the reference date and time of a container of 100 mCi is 15th Oct 2022; 5.30 pm. Calculate the activity of the container on,
- 1.4.1. 15th Oct 2022; 8.30 am **(15 marks)**
- 1.4.2. 16th Oct 2022; 8.30 am **(15 marks)**
- 1.5. Convert 100 mCi activity into MBq. **(15 marks)**
- 1.6. Define the term “effective half-life” of a radiopharmaceutical. **(15 marks)**

02.

- 2.1. List five benefits of $^{99\text{m}}\text{Tc}$ radioisotope in nuclear imaging. **(10 marks)**
- 2.2. Briefly describe the transient equilibrium of ^{99}Mo - $^{99\text{m}}\text{Tc}$ using the time-activity graph. **(25 marks)**
- 2.3. Using a labeled diagram, briefly explain how the $^{99\text{m}}\text{Tc}$ elutes from a generator. **(25 marks)**
- 2.4. Draw a graph to show the variation in daughter product activity and parent activity over time when eluted daily from the technetium generator. **(20 marks)**
- 2.5. Briefly describe the role of a generator in nuclear imaging. **(20 marks)**

03.

- 3.1. Define the absorbed dose of ionizing radiation. (10 marks)
- 3.2. Briefly explain the difference between absorbed dose and equivalent dose. (15 marks)
- 3.3. Gamma radiation has deposited 3J of energy in a person with 60 kg of weight. Radiation weighting factor for alpha, beta and gamma radiations are 20, 1 and 1 respectively.
- 3.3.1. Calculate the absorbed dose received by the above person. (10 marks)
- 3.3.2. If the person additionally receives 0.01Gy dose from alpha radiation and 0.02 Gy dose from beta radiation, calculate the total equivalent dose to tissue. (20 marks)
- 3.4. The exposure rate at 1m distance from a ^{137}Cs source is 500 mR/ hr. Calculate the exposure to a person who stays for 30 minutes at a distance of 2m from the source. (20 marks)
- 3.5.
- 3.5.1. Name a radionuclide used in the gamma sterilization process. (05 marks)
- 3.5.2. Briefly describe the advantages of using gamma radiation for surgical instrument sterilization compared to heat steam sterilization. (20 marks)

04.

- 4.1. Briefly explain the following with regards to ionizing radiation giving two examples for each. (20 marks)
- 4.1.1. Stochastic effect
- 4.1.2. Deterministic effect
- 4.2. Write the recommended whole-body annual dose limits for occupational and public exposure. (10 marks)
- 4.3. Briefly describe the personal radiation safety steps that should be taken by a radiopharmacist before entering to a radiopharmaceutical laboratory. (25 marks)
- 4.4. Briefly explain how you would decontaminate the working area of LAF cabinet before starting a preparation. (30 marks)
- 4.5. List five information that should be included in the label of a radiopharmaceutical syringe. (15 marks)

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