

**UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES****DEPARTMENT OF PHARMACY****FOURTH BPHARM PART II EXAMINATION – OCTOBER 2021****PH 4241 RADIOPHARMACY – 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

1.1.1 Define the term “Radiopharmacy”. (10 marks)

1.1.2 Briefly discuss the applications of Radiopharmacy. (20 marks)

1.2 Radionuclides are produced artificially in nuclear reactors and cyclotrons.

1.2.1 Name two radionuclides each used in above two systems. (10 marks)

1.2.2 State four types of ionizing radiations emitted by radionuclides. (10 marks)

1.3 List the requirements to be considered for the use of a radionuclide in nuclear imaging. (20 marks)

1.4 Briefly explain the significance of radionuclide generators used in nuclear imaging. (15 marks)

1.5 List five precautions that should be taken when handling radioactive materials. (15 marks)

02.

2.1 Briefly compare the physical properties of beta radiation and gamma radiation. (15 marks)

2.2 State two units in the measurement of radioactivity and give the relationship between them. (15 marks)

2.3 Calculate the average activity of a radioactive source, if 1800 atoms decay in 5 seconds. (10 marks)

2.4 State the balanced equation to calculate the activity of a radioactive source after time t and explain the meaning of each of its terms. (15 marks)

- 2.5 Briefly describe how does the half-life relates to decay factor. (10 marks)
- 2.6 The half-life of ^{99m}Tc is 6 hours and the elute activity is 500 MBq. Calculate the amount of radio activity remains in the vial after 3 hours. (15 marks)
- 2.7 Giving an example, briefly describe the transient equilibrium of a radioisotope using the time activity graph. (20 marks)

03.

- 3.1 Define the following with regards to the investigation of a tissue or an organ of the body and state their units.
- 3.1.1 Absorbed dose (10 marks)
- 3.1.2 Equivalent dose (10 marks)
- 3.2 Energy absorbed per kilogram of tissue is 1.5 Joules from a gamma ray source. Find the absorbed dose and the equivalent dose. (15 marks)
- 3.3
- 3.3.1 Define the intensity of radiation and give its SI units. (10 marks)
- 3.3.2 If the exposure rate of a ^{192}Ir source was found to be 50 mR/h at 3 m, what is the exposure rate at 30 cm distance from the source? (15 marks)
- 3.4 What is meant by “controlled radiation area”? (20 marks)
- 3.5 Briefly explain two devices which are used for personal radiation monitoring. (20 marks)

04.

- 4.1 State the three principles of radiation protection. (15 marks)
- 4.2 What is meant by “low level radioactive waste”? (15 marks)
- 4.3 State the recommended whole body annual dose limits for occupational and public exposure. (10 marks)
- 4.4 Exposure to ionizing radiation causes both stochastic and deterministic effects.
- 4.4.1 Give two examples each of the above two effects. (10 marks)
- 4.4.2 What are the main differences between these two effects? (20 marks)
- 4.5 Briefly describe three types of DNA damage caused by ionizing radiation. (30 marks)

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