

UNIVERSITY OF JAFFNA, SRI LANKA
BACHELOR OF SCIENCE IN MEDICAL LABORATORY SCIENCES

THIRD YEAR SECOND SEMESTER EXAMINATION - JAN 2013

MLSNM 3204 NUCLEAR MEDICINE

Date: 24.01.2013

Time: 2 Hours

ANSWER ALL SIX QUESTIONS. (Part A and Part B in separate answer books)

Part A

1.

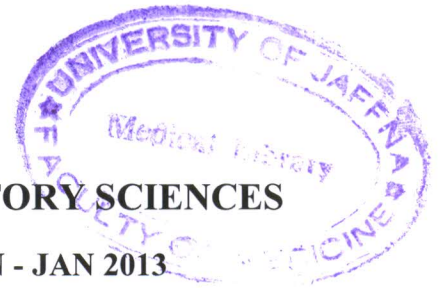
- 1.1 Draw a labeled diagram and explain "Bremsstrahlung radiation" in X-ray production. (25 Marks)
- 1.2 What is the importance of "rotating anode" used in X-ray tube? (25 Marks)
- 1.3 Explain how a radiographer controls the X-ray beam of an X-ray plant? (50 Marks)

2.

- 2.1 Briefly describe the function of fluorodeoxyglucose (FDG) in nuclear medicine imaging. (40 Marks)
- 2.2
- 2.2.1. Discuss the imaging principle of a gamma camera. (30 Marks)
- 2.2.2. Explain why different types of collimators used in gamma camera. (30 Marks)

3.

- 3.1 Briefly describe the production method of a radionuclide by Cyclotron. (40 Marks)
- 3.2
- 3.2.1. Discuss the working principle of a scintillation detector in measurement of ionizing radiation. (40 Marks)
- 3.2.2. List the different types of area monitors in radiation measurement. (20 Marks)



4.

4.1 State the principle of radioimmunoassay for separation of protein from a mixture by using radioactivity. (60 Marks)

4.2 List the important features of Tc-99m radionuclide generator. (40 Marks)

5.

5.1 Explain the effect of “chromosome aberrations” by ionizing radiation. (40 Marks)

5.2 Calculate the time interval to reduce the activity from 3000 Ci to 2000 Ci of a Co-60 radionuclide. (Half life of a Co-60 is 5.26 years) (60 Marks)

Part B

6. Safe use of radiation in the field of medicine is practiced with very minimal hazards to the patient as well as to the medical staff.

6.1 Describe briefly about the various interactions of photon radiation with matter, mentioning its uses in the clinical practice. (30 Marks)

6.2 In the treatment of cancer using radiation many technological advances have been incorporated.

6.2.1 Briefly explain the following radiation techniques

6.2.1.1 Intensity Modulated Radio Therapy (IMRT) (10 Marks)

6.2.1.2 Image Guided Radio Therapy (IGRT) (10 Marks)

6.2.1.3 Gamma Knife (10 Marks)

6.2.1.4 Volume Modulated Arc therapy (VMAT) (10 Marks)

6.3 In the treatment of certain cancers radioactive substances are given by various modes. Give examples of such uses in the following instances mentioning the isotopes used, half life, mode of delivery and safety concerns.

6.3.1 Thyroid Cancer

(15 Marks)

6.3.2 Cancer of Uterine Cervix

(15 Marks)

