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UNIVERSITY OF JAFFNA, SRI LANKA
BACHELOR OF SCIENCE IN MEDICAL LABORATORY SCIENCES
THIRD YEAR SECOND SEMESTER EXAMINATION- FEBRUARY 2014
MLSNM 3204 NUCLEAR MEDICINE

Date: 28.02.2014

Time: 2 Hour

ANSWER ALL QUESTIONS
ANSWER EACH PART IN SEPARATE BOOKLET.

PART A

1.

- 1.1 Draw a labeled diagram and explain each component of a medical X-ray tube. (30 Marks)
- 1.2 Distinguish between production of X-ray and Gamma ray? (30 Marks)
- 1.3 Explain the biological effect of X-radiation interaction with tissue? (40 Marks)

2.

- 2.1 Explain the imaging technique of a gamma camera with the help of suitable diagram. (50 Marks)
- 2.2 Briefly describe the production method of radionuclide Tc-99m. (50 Marks)

3.

- 3.1 Explain the technique of "radioimmunoassay". (60 Marks)
- 3.3 Discuss the advantages and disadvantages of radioimmunoassay. (40 Marks)

4.

- 4.1 Discuss the working principle of a free air ionization chamber in measurement of ionizing radiation. (40 Marks)
- 4.2 Define radiation exposure and give its units. (20 Marks)
- 4.3 Calculate the thickness of copper to reduce the gamma radiation exposure rate from 600 mR/h to 200 mR/h. (40 Marks)
- (HVL of a monochromatic beam in copper is 3 cm)

5.

5.1 Distinguish between Compton effect and Photo electric effect. (30 Marks)

5.2 Sketch a plot to show how the relative strength of different radiation interaction mechanisms, changes in a tissue with varying energy of the incident photon radiation. (40 Marks)

5.3 Briefly describe the deterministic effect in radiation protection. (30 Marks)

PART B

6.

Radio isotopes are used for the diagnosis and treatment of diseases in the field of Medicine. When using the radio isotopes for this purpose, those who handle these isotopes should take safety precautions, recommended by the Atomic Energy Agency.

6.1 Name 3 radio isotopes that are frequently used for diagnosis and treatment. (15 Marks)

6.2 What is meant by half life of a radio isotope? (10 Marks)

6.3 Mention half life of each isotope you mentioned in 6.1. (15 Marks)

6.4 What are the factors that will minimize radiation exposure? (30 Marks)

6.5 What is the advantage of doing PET CT Scan in a cancer patient? (15 Marks)

6.6 How do you measure occupation related radiation exposure? (15 Marks)