- NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF RADIOGRAPHY

BSc. (Hons) IN RADIOGRAPHY PART III

NUCLEAR MEDICINE

SRA 3210

Second Semester Examination Paper

March 2025

Time Allowed : 3 hours

Total Marks : 100

Special Requirements: None

Examiner's Name : Dr Lidion Sibanda

INSTRUCTIONS

ANSWER ALL PARTS OF QUESTION 1 IN SECTION A AND ANY THREE QUESTIONS FROM SECTION B. SECTION A CARRIES 40 MARKS AND SECTION B CARRIES 60 MARKS.

MARK ALLOCATION

QUESTION	MARKS
1.	**40**
2.	**20**
3.	**20**
4.	**20**
5.	**20**
6.	**20**
Maximum possible mark	**100**

SECTION A

1 (a) With respect to Nuclear Medicine, distinguish between an Isotopic Tracer and a Physical Tracer. [3]

(b) Distinguish radioactive contamination from radioactive exposure. [6]

(c) Differentiate "Radioprotectors" from "Radiosensitisers". [4]

(d) Outline two components that usually comprise radiopharmaceuticals. [4]

(e) Relate physical half-life, biological half-life and effective half-life [6]

f) Explain considerations made in choosing a radiopharmaceutical. [6]

g) Critique the suitability of radioactive uranium in nuclear medicine. [6]

h) Explain the value of lyophilization process in Nuclear Medicine. [5]

SECTION B

2. (a) Why would a service provider choose to use a hybrid PET-MRI scan? [4]

(b) Explain how radiopharmaceutical external contamination incidents are generally handled in nuclear medicine departments. [16]

3. (a) A nuclear medicine research team needs to introduce a new radiopharmaceutical. Describe the processes that they must follow. [10]

(b) Outline the steps followed from dispensing through to intravenous administration of a radiopharmaceutical to a patient [10]

4. (a) Justify the existence of a nuclear medicine department beyond a diagnostic radiography department. [5]

(b) In Nuclear Medicine, the radionuclide must emit monoenergetic gamma photons, with high abundance, must decay by electron capture or isomeric transition. Discuss. [15]

5. (a) Why must radiopharmaceuticals be confirmed sterile and apyrogenic before administering them to patients. [5]

(b) Explain radiation protection and safety measures associated with a patient who has received a radiopharmaceutical dose. [15]

6. (a) In Nuclear Medicine and radiotherapy, an understanding of the terms "cell death" and "Organs At Risk" (OAR) is important. Discuss. [6]

(b) Distinguish Quality Control and Quality Assurance as applied to nuclear medicine Nuclear Medicine. [14]

END OF EXAMINATION