NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OFAPPLIED SCIENCES

DEPARTMENT OF RADIOGRAPHY

BSc (Hons) Radiography

COMPUTED TOMOGRAPHY IMAGING

SRA 3116

First Semester Examination Paper

December 2024

This examination paper consists of 3 printed pages

Time Allowed : 3 hours

Total Marks : 100

Special Requirements: None

Examiner's Name : Mr K Ndlovu

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) Outline how dose can be reduced in CT imaging [8]

(b) (i) What is a slip ring as applied in CT imaging? [2]

(ii) State the three applications of slip rings in a CT machine gantry. [3]

(c) With the aid of a simple diagram briefly explain the three different types of detector configurations used in multi detector CT machines. [6]

(d) Discuss the purpose of administering

(i) oral contrast media [3]

(ii) intravenous contrast media [3]

(e) (i) Explain why visualisation of tumours is enhanced following contrast media administration. [2]

(ii) State 3 contraindications to use of contrast media [3]

(f) Outline the differences between an extradural hematoma and a subdural hematoma. [4]

(g) Define the following terms

(i) Linear attenuation coefficient [2]

(ii) Spatial resolution [2]

(iii) Contrast resolution [2]

SECTION B

2. Discuss the instrumentation of Computed Tomography machine. [20]

3. Evaluate recent CT examination developments explaining at least one advantage of perform these examinations:

(a) Perfusion CT [4]

(b) CT Colonoscopy [4]

(c) CT Bronchoscopy [4]

(d) CT Angiography [4]

(e) Positron Emission Tomography CT [4]

4 (a) Describe how you would prepare for a CT scan of the abdomen and pelvis with oral and IV contrast media. [10]

(b) Explain how a Gray scale image is formed in CT imaging [10]

5 (a) With the aid of a block diagram describe the basic data acquisition scheme in Computed Tomography. [10]

(b) Explain how the following factors affect dose in Computed Tomography

(i) KV [2]

(ii) mAs [2]

(iii) Pitch [2]

(iv) Collimation [2]

(v) Patient size [2]

6 (a) Explain the following brain pathologies appearances as seen after administering CT contrast outlining whether they will cause midline shift or not:

(i) Brain abscesses [3]

(ii) Brain cysts [3]

(iii) Brain tumour or metastases [3]

(b) Name 5 blood vessels that form the circle of Willis. [5]

(c) Explain the use of a pressure pump in CT contrast media injection and bolus tracking as it used in certain CT procedures. [6]

END OF EXAMINATION