

The Royal Australian and New Zealand College of Radiologists[®]

The Faculty of Clinical Radiology

RANZCR Clinical Radiology Phase 1 Applied Imaging Technology (AIT) Examination Sample Questions

Constructed Response Questions (CRQ):

Each CRQ is worth 10 marks, with 9 questions in total. The CRQ section will be worth 90 marks total.

Sample questions:

- 1.
- a) Identify the major study which has contributed most to our knowledge of the carcinogenic effects of radiation. (1 mark)
- b) Name four organs or tissues most sensitive to radiation. (2 marks)
- c) The total air kerma incident on an area of a patient's skin during a lengthy vascular procedure is estimated to be 5Gy. State two possible tissue reactions the patient may experience, and their approximate timeframes. What should be the response of the clinical centre to such an event? (3 marks)
- d) It is a general observation that reducing peak skin dose (PSD) to the patient is associated with reduced occupational dose to the operator. List four practical measures, each of which would ensure minimized patient PSD, and therefore operator dose. (4 marks)





- a) The image shows a CT slice containing beam hardening and an additional artefact. Name this additional artefact and briefly explain why it has occurred. (2 marks)
- b) A CT exam is performed where the exposure factors are 120 kV, 150 mAs and a pitch of 1:1. Automatic current modulation is not employed. The reconstruction is performed using filtered back projection with a bone filter. The reconstructed slice width is 1 mm. The resultant images are too noisy.
 - i. If the patient is to be rescanned, discuss how you would change the mAs to decrease the amount of noise, explaining how the change you suggest leads to the desired improvement. (2 marks)
 - ii. State the effect of this mAs change on the effective dose received by the patient and explain why it occurs. (2 marks)
 - iii. List two ways that the initial data set could have been reconstructed to decrease the amount of noise without having to rescan the patient. For each, briefly explain why the noise is reduced. (4 marks)

2.

Multiple Choice Questions (MCQ)

Each MCQ is worth one mark, with 60 questions in total. The MCQ section will be worth 60 marks total.

Sample Questions:

- 1. The total number of gamma photons imaged in a typical nuclear medicine bone scan is of the order of:
 - a. 10,000
 - b. 50,000
 - c. 100,000
 - d. 250,000
 - e. 1,000,00

Answer: E

- 2. A competing process to characteristic X-ray production that predominates in low Z elements is:
 - a. Auger electron emission
 - b. electron cascade
 - c. X-ray photon cascade
 - d. photomultiplication
 - e. photodisintegration

Answer: A

- 3. The magnification mode of an image intensifier is switched from 15 cm to 30 cm. In order to maintain the same image brightness, the exposure at the image intensifier input phosphor must roughly:
 - a. Halve
 - b. Remain the same
 - c. Double
 - d. Quadruple
 - e. Be quartered

Answer: E

- 4. In CT scanning, the phenomenon of volume averaging is due to:
 - a. inability of the computer to reconstruct an image containing large density differences
 - b. part of the scanned volume of tissue lying outside the circle of reconstruction
 - c. change in volume of an organ during the period of data acquisition
 - d. tissues of different density lying within the same voxel
 - e. differences in the volumes of adjacent voxels

Answer: D