

**POSTGRADUATE INSTITUTE OF MEDICINE**  
**UNIVERSITY OF COLOMBO**

**MD (RADIOLOGY) PART I EXAMINATION - DECEMBER 2021**

**ESSAY PAPER**

**Date:** 02<sup>nd</sup> December 2021

**Time:** 9.30 a.m. – 11.30 a.m.

Answer each question in a separate book.

**Answer all questions.**

Each question carries 100 marks.

**PART A**  
**RADIATION PHYSICS AND RADIATION PROTECTION**

1.
  - 1.1. Draw the energy spectrum graph with labelled axis for x-rays produced by Tungsten target x-ray tube operated at 90 kVp tube potential. (20 marks)
  - 1.2. On the same graph, show how the spectrum would be changed by
    - (i) adding 2.5 mm Aluminum filtration (10 marks)
    - (ii) increasing tube potential to 100 kVp (10 marks)
  - 1.3. Briefly describe the physical processes involved in the formation of Bremsstrahlung and characteristic radiation. (20 marks)
  - 1.4. Discuss how kVp affects the radiographic contrast. (20 marks)
  - 1.5. Why are the higher kVp and longer FFD (film focus distance) used in chest radiography? (20 marks)
2.
  - 2.1. Explain the reasons for the flowing blood to appear darker in spin echo MRI and brighter in gradient echo MRI. (50 marks)
  - 2.2. Explain the physical basis of contrast enhancement with Gadolinium contrast agents in MRI. (20 marks)
  - 2.3. Explain why fat suppression is required in contrast enhanced magnetic resonance angiography (CE MRA). (15 marks)
  - 2.4. Explain how the signals from the background tissues are suppressed in CE MRA. (15 marks)

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**PART B**  
**ANATOMY, TECHNIQUES AND RADIOGRAPHY**

1. A 50-year-old lady presented to the emergency department with cough & shortness of breath for 3 days duration. Covid 19 PCR was positive.
  - 1.1. What are the available imaging modalities of the respiratory system for this patient. (15 marks)
  - 1.2. Briefly describe the CT protocol of HRCT chest. (35marks)
  - 1.3. Draw a labelled line diagram of cross section of Axial CT thorax at the level of pulmonary trunk. (50 marks)
2.
  - 2.1. Draw a labelled line diagram of the coronal section through the R/Hip as seen in T2W MRI scan (MRI intensities are not expected). (50 marks)
  - 2.2. List the plain radiographic views of the right hip joint. (15 marks)
  - 2.3. Briefly describe the radiographic technique of one of the above views. (35 marks)
3.
  - 3.1. Enumerate the imaging modalities and diagnostic procedures available for the radiological assessment of the pancreas. (20 marks)
  - 3.2. Outline the preparation and technique of ultrasound scan of the pancreas. (40 marks)
  - 3.3. Briefly describe the sonographic anatomy of the pancreas and its relationships to the neighboring structures. (40 marks)
4.
  - 4.1. Draw a labelled line diagram of T2W MRI axial scan of the spine at L4/L5 intervertebral disc level. (40 marks)
  - 4.2. Briefly discuss the blood supply to the spinal cord. (30 marks)
  - 4.3. Describe the technique of percutaneous nephrostomy insertion. (30 marks)