

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN BIOMEDICAL SCIENCE AND TECHNOLOGY

BMET 444: BIOMEDICAL INSTRUMENTATION

STREAMS: BSc. Biomedical Sc and Technology(Y4S2)

TIME: 2 HOURS

DAY/DATE: THURSDAY 20/4/2023

8.30 P.M. – 10.30 A.M.

INSTRUCTIONS:

- **Answer question ONE and any other Two questions**

QUESTION ONE

- Explain why, soft tissue organs such as the spinal cord, kidneys, bladder, gut and blood vessels are very poorly resolved by a single projection X-ray. (5 marks)
- Explain how imaging of the outline of the gut can be enhanced. (5 marks)
- Using an example, explain how dose related effects of ionizing radiations limit X-ray investigations. (5 marks)
- Explain the advantages that the CTscan would have over X-ray during clinical investigations. (5 marks)
- Explain how imaging is achieved for patients undergoing a heart scan. (5 marks)
- A clinician wants to investigate cerebral blood flow in the foetus. Explain the imaging technique he should opt for. (5 marks)

QUESTION TWO

- Describe the application of the various types of ^{99m}Tc labeled radionuclide in clinical investigations. (10 marks)

- b. Besides pregnancy, describe the use of ultrasound in other clinical investigations and explain specific clinical situations where it cannot be used. (10 marks)

QUESTION THREE

- a. Describe the advantages of magnetic resonance imaging (MRI) over computer tomography (CT) in clinical investigations. (10 marks)
- b. Describe how interventional radiological procedures have transformed clinical investigations. (10 marks)

QUESTION FOUR

- a. Describe any clinical or research applications for which PET and SPECT offer a significant advantage over fMRI. (10 marks)
 - b. Describe the technical difficulties that need to be overcome for fMRI and EEG to be recorded simultaneously and provide complementary spatial and temporal information. (10 marks)
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