



## DEPARTMENT OF PHYSICAL SCIENCES

### EXAMINATION FOR THE AWARD OF DEGREE IN BACHELOR OF SCIENCE IN BIOCHEMISTRY

#### BIOC 240: BIOCHEMICAL INSTRUMENTATION

LECTURER: Mrs. TABITHA ITOTIA

#### INSTRUCTIONS:

Answer question ONE and any other TWO questions

Do not write on the question paper

#### QUESTION ONE

- a) Define the following terms as used in biochemical instrumentation: (4 marks)
- Sensors
  - Spectroscopy
  - Bioinformatics
  - LASER
- b) Differentiate between; (6 marks)
- Telemedicine and Telehealth
  - Angiography and Mammography
  - Electron and Light Microscope
- c) Explain the characteristics of LASER light waves and state four functions of LASERs. (5 marks)
- d) State the benefits and challenges of Telemedicine and Telehealth. (4 marks)
- e) Describe the principle of **Magnetic Resonance Imaging (MRI)**. (5 marks)
- f) Name the standard tracer used to evaluate neoplastic tissue in Positron emission tomography (PET) and state its half-life. (2 marks)
- g) Illustrate and explain the working principle of the pH meter. (4 marks)

#### QUESTION TWO

- a) Discuss the various applications of telemedicine. (6 marks)
- b) Describe the **pulse oximetry monitoring** as an application of sensors. (6 marks)
- c)
  - i. Define a **database**? (2 marks)
  - ii. Briefly discuss the classification of **biological databases** in bioinformatics. (6 marks)

### QUESTION THREE

- a) Discuss common applications of X-ray imaging. (6 marks)
- b) Describe some of the practical safety concerns required for work in MRI rooms. (6 marks)
- c) **Nuclear magnetic resonance (NMR)** is the most powerful and widely used spectroscopic method for the determination of molecular structures in solution and pure liquids. Using a well-labelled diagram, discuss the governing principle of NMR. (8 marks)

### QUESTION FOUR

- a) List at least 5 spectroscopic techniques and explain their functions. (5 marks)
- b) Virtually all experiments conducted in a biochemistry laboratory present a potential risk to the well-being of the investigator. Discuss the various sources of health hazards. (8 marks)
- c) Define **Good Laboratory Practice (GLP)** and briefly explain its importance. (3 marks)
- d) Using a flow diagram, differentiate between a technique, a method, a procedure and a protocol. (4 marks)