

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE (BIOMEDICAL SCIENCE AND TECHNOLOGY)

BMET 444: BIOMEDICAL ENGINEERING AND INSTRUMENTATION

STREAMS: BMET

TIME: 2 HOURS

DAY/DATE: TUESDAY 14/04/2020

8.30 AM – 10.30 AM

INSTRUCTIONS:

- **Answer question One (compulsory) and any other Two questions**
- **Sketch diagrams may be used whenever they may help illustrate your answer**
- **Do not write anything on the question paper**
- **This is a closed book exam. No reference materials are allowed in the examination room**
- **There will be No use of mobile phones or any other unauthorized materials**
- **Write your answers legibly and use your time wisely**

QUESTION ONE (30 MARKS) COMPULSORY

- (a) Discuss different types of biomedical signals. [8 marks]
- (b) Explain three types of standards for biomedical devices. [6 marks]
- (c) Discuss eight static performance characteristics of transducers used in biomedical instruments. [8 marks]
- (d) Discuss four (4) types of recorders found in biomedical instruments. [8 marks]

QUESTION TWO (20 MARKS)

- (a) Explain basic components of a biomedical instrumentation system. [8 marks]
- (b) With a use of a suitable diagram, demonstrate a normal wave pattern of an electrocardiogram waveform recorded in the standard lead position. [8 marks]

- (c) Identify some five medical problems that can be diagnosed or monitored using an electroencephalogram. [4 marks]

QUESTION THREE

- (a) Explain two important factors to be considered when designing a biomedical instrument. [6 marks]
- (b) Discuss the ideal properties of the gel used in electrocardiogram (ECG) [6 marks]
- (c) Discuss the principle of action of a dialysis machine and differentiate hemodialysis from peritoneal dialysis. [8 marks]

QUESTION FOUR (20 MARKS)

- (a) Discuss six constraints to be considered when designing a measurement system for biomedical application. [6 marks]
- (b) Illustrate eight advantages of optical fibre sensors used in biomedical instruments. [6 marks]
- (c) Discuss the principle of action of an ultrasound in medical diagnostics. [8 marks]
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