

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

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

BMED 448: FUNDAMENTALS OF BIOENGINEERING

STREAMS: BSC (BIOMED)

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 06/12/2017

11.30 A.M. – 1.30 P.M.

INSTRUCTIONS:

- Answer question ONE (COMPULSORY) and any other TWO questions
- Sketch diagrams may be used whenever they may help to 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)

- (a) Describe the bioengineering and recovery processes involved in the manufacturing of penicillin. [8 marks]
- (b) Describe the various steps involved in downstream processing. [7 marks]
- (c) Discuss several types of display devices that are useful in the biomedical instrumentation. [8 marks]
- (d) Discuss the major classes of biosensors mentioning the major quantities monitored by them. [7 marks]

QUESTION TWO (20 MARKS)

- (a) Discuss the bioengineering and purification process of streptomycin. [8 marks]
- (b) Discuss the functions performed by a processor in biomedical instrumentation systems. [6 marks]
- (c) Discuss the following in relation to bioengineering
- (i) Biomaterial [2 marks]
 - (ii) Biological material [2 marks]
 - (iii) Bio-compatibility [2 marks]

BMED 448

QUESTION THREE (20 MARKS)

- (a) Discuss how cell disruption is carried out in downstream processing. [8 marks]
- (b) Discuss three general requirements for transducers used in instrumentation systems. [3 marks]
- (c) Document five (5) problems associated by permanent implants used in bioengineering. [5 marks]
- (d) Discuss four (4) advantages of biodegradable implants. [4 marks]

QUESTION FOUR (20 MARKS)

- (a) Discuss the following terms in the field of bioengineering.
 - (i) Sensitivity [1 mark]
 - (ii) Stability [1 mark]
 - (iii) Specificity [1 mark]
 - (iv) Accuracy [1 mark]
 - (v) Precision [1 mark]
 - (vi) Resolution [1 mark]
 - (b) Discuss three (3) main advantages of magnesium based alloys used in bioengineering for manufacturing of biomedical important biomaterials. [3 marks]
 - (c) Explain what are biosensors and its uses in the field of bioengineering? [4 marks]
 - (d) Discuss various laboratory test conducted in the implant manufacturing industry to ensure that materials used are of no harm to human. [7 marks]
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