

**CHUKA**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE  
OF BACHELOR OF SCIENCE IN BIOCHEMISTRY**

**BIOC 230: FUNDAMENTALS OF BIOTECHNOLOGY**

**STREAMS: BSC (BIOC)**

**TIME: 2 HOURS**

**DAY/DATE: WEDNESDAY 15/04/2020**

**11.30 A.M. – 1.30 P.M.**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS**

**QUESTION 1 (COMPULSORY) – 30 MARKS**

- (a) Give one example of protein of non-bacterial origin with biotechnological, medical or pharmacological importance that is expressed in bacteria. Describe the advantages of expressing a protein in bacteria. [5 marks]
- ((b) (i) Distinguish between a cloning vector and an expression vector. [4 marks]
- (ii) Describe the role of *Agrobacterium tumefaciens* in production of transgenic plants [2 marks]
- (c) Highlight the basic steps involved in the process of DNA cloning. [5 marks]
- (d) (i) Define 'strain improvement' as used in biotechnology. [2 marks]
- (ii) Explain the purpose of strain improvement. [3 marks]
- (e) Explain the drawback associated with direct conversion of laboratory-scale process into an industrial process which is economically viable. [4 marks]
- (f) Give the general components of a fermentation medium. [5 marks]

**QUESTION 2 (20 MARKS)**

- (a) Discuss the major applications of biotechnology and genetic engineering in medicine, environmental, agriculture, legal and pharmaceutical fields. [10 marks]

## BIOC 230

- (b) Despite the many breakthroughs in the field of biotechnology and genetic engineering, there are some societal concerns about the technology. Explain these concerns. [2 marks]
- (c) List any 4 applications of plant tissue culture. [2 marks]

### QUESTION 3 (20 MARKS)

- (a) Describe four characteristics phases of microbial growth once its inoculated in the bioreactor. [10 marks]
- (b) Mutation is one of the methods used in strain improvement. Highlight the four methods to detect and isolate mutants. [8 marks]
- (c) Define genetic engineering. [2 marks]

### QUESTION 4 (20 MARKS)

- (a) Describe the different types of bioreactors and fermentation processes. [10marks]
  - (b) Using a schematic diagram illustrate the production of monoclonal antibodies by hybridoma technology. [10 marks]
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