CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

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

BIOC 230: FUNDAMENTALS OF BIOTECHNOLOGY

STREAMS:Y2S2 **TIME: 2 HOURS**

DAY/DATE: TUESDAY 10/04/2018 **8.30 A.M – 10.30 A.M**

INSTRUCTION:

- **Answer question one and any other two questions**
- **Do not write on the question paper**

1. (a) Outline how oxygen transfer rate of a reaction can be increased and maintained for smooth operation and better product output? [3marks]

   (b) Outline the main functions of an impeller. [3marks]

   (c) State factors that influence bulk mixing and micro mixing. [3marks]

   (d) Other than traditional forms of fermentation technology that are related to foods and beverages, describe the new bioprocess products that are being derived from microbial, mammalian and plant cell fermentations. [4marks]

   (e) Outline major applications of animal cell cultures. [2marks]

   (f) Briefly describe a bacterial recombination mechanism through which *Klebsiella sp.* can undergo such that it becomes difficult to treat if implicated in opportunistic infection of a would. [5marks]

   (g) Outline the disadvantages of producing organic compounds by biological rather than chemical means. [4marks]

   (h) Outline the basic steps involved in the process of the recombinant DNA technique for gene cloning. [4marks]

(i) Briefly describe transfection as a method used for the transformation of cultured cells. [20marks]

2. (a) Discuss the unique aspects of biological process that need to be taken into consideration when designing a bioreactor. [8marks]

   (b) Discuss the general requirement for bioreactor design. [12marks]

3. (a) Discuss batch cultivation as one of the main biotechnological processes for growing microorganisms in the bioreactor. [10marks]

   (b) Explain how one would micro propagate virus free plants. [10marks]

4. (a) Discuss the basic molecular techniques for the *in vitro* transfer and expression of foreign DNA in a host cell. [12marks]

   (b) Explain how you could obtain an auxotrophic mutant of *Escherichia coli* for Arginine(Arg). [8marks]
