CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

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

BIOC 414: BIOTECHNOLOGY II

STREAMS: BSC (BIOC) Y4S2   **TIME: 2 HOURS**

DAY/DATE: THURSDAY 11/04/2019   **11.30 AM – 1.30 PM**

INSTRUCTIONS:

- **Answer Question One and any other Two Questions**
- **Do not write on the question paper**

Question One

(a)   Classical mutagenesis often involves the use of chemical mutagens or UV radiation to induce mutations in the target microorganisms. Describe an experiment to induce mutation in bacterial using UV-radiation.   [5 marks]

(b)   Explain two special equipments that are important for a cell culture laboratory.
                                                                    [6 marks]

(c)   Explain senescence and contact inhibition characteristics of animal cell culture.
                                                                    [5 marks]

(d)   Distinguish between the normal cell lines and immortalized cell lines.   [4 marks]

(e)   Explain five examples of classical applications of micropropagation in plant cell culture.
                                                                    [10 marks]

Question Two

(a)   Discuss the production of recombinant Tissue Plasminogen Activator (t-PA)
                                                                                                [10 marks]

(b)   Discuss giving two examples each of the diagnostic and therapeutic applications of monoclonal antibodies in biomedical sciences.   [10 marks]

Question Three

(a)   A biotechnologist has in his lab a gene of interest already digested with HaeIII restriction enzyme. He wants to clone the gene using a plasmid P^{BR322} as a cloning vector and E.coli DH5 α as the host cell. The PstI is available in the lab. Discuss the strategies for cloning   such gene.   [12 marks]

(b)   Discuss screening for the recombinant bacteria using antibiotic resistance genes as markers   from question 3(a) above.   [8 marks]

Question Four

(a)   Discuss using relevant examples, the production of diagnostic proteins, therapeutic proteins and edible vaccines using transgenic plants as bioreactors.   [10 marks]

(b)   Explain the microcarriers and macrocarriers scale-up processes of cell culture systems. Highlight the key advantages of these over other scale up systems.   [10 marks]