UNIVERSITY OF GHANA

BSC. SECOND SEMESTER EXAMINATIONS: 2014/2015

FPEN 311: INTRODUCTION TO BIOTECHNOLOGY (2 Credits)

INSTRUCTIONS: ANSWER QUESTION 1 AND THREE OTHER QUESTIONS

TIME ALLOWED: TWO (2) HOURS

1. You are applying for a research grant to fund your research on genetically modified organisms with potential commercial application. Explain in detail how you will produce a genetically modified organism (GMO) of your choice: include the basic steps of genetic engineering and the traits that will be expressed in the GMO.

2.
   a. Draw a typical fermenter and indicate the main components.
   b. What are the key considerations in designing a fermenter?
   c. List the minimum component requirements for cultivation of microbes.

3.
   a. Nucleic acids are the basic store of genetic information. Discuss the composition of nucleic acids and explain how the stored information is decoded and used.
   b. Explain the process of Somatic Cell Nuclear Transfer.
   c. RoundUp Resistant plants are an example of a genetically modified organism. Explain the modification.

4.
   a. Differentiate between primary and secondary metabolism of microorganisms.
   b. Briefly comment on restriction endonucleases and their role in genetic engineering.

c. Write out the resulting strands after treatment of the following DNA strand with the respective restriction endonuclease indicated in the table below.

5′C C T C G A G C G C C C G A A G C T T G G A G T T A A C G C 3′
3′G G A G C T C G C G G G C T T C G A A C C T C A A T T G C G 5′

Enzyme	Target sequence
Hha I	5′GCG*C3′ 3′C*GCG5′

Enzyme	Target sequence
Hind III	5′A*AGCT T3′ 3′T TCGA*A5′

Enzyme	Target sequence
Hpa I	5′GTT*AAC3′ 3′CAA*TTG5′

5.

a. Using specific examples, discuss the application of industrial microbiology for the production of useful ingredients and additives within the food industry.

b. Explain briefly the current situation of biosafety regulation in Ghana.