NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY

BACHELOR OF SCIENCE HONOURS DEGREE IN APPLIED BIOLOGY AND BIOCHEMISTRY

MOLECULAR GENETICS AND BIOTECHNOLOGY SBB 4105

EXAMINATION PAPER

DECEMBER 2017

This examination paper consists of 2 pages

Time Allowed: **3 hours**

Total Marks: **100**

INSTRUCTIONS TO CANDIDATES

1. **Answer Four (4) Questions. Each question carries 25 marks.**
2. **Where a question contains subdivisions, the mark value for each subdivision is given in brackets.**
3. **Illustrate your answer where appropriate with large, clearly labelled diagrams.**

1.(a) Describe the following and state their applications in molecular genetics;

(i) minisatellites, (4 marks)

(ii) microsatellites and (6 marks)

(iii) ribosomal RNA genes. (5 marks)

(b) Compare the genetic structure of eukaryotic and prokaryotic protein coding regions including their regulatory elements. (10 marks)

2. Discuss the **SIX** classes of naturally occurring plasmids and briefly describe how plasmids are exploited in biotechnology.

3. Give a detailed account of DNA replication as it occurs in *Escherichia coli.*

4. Describe the following variations of PCR and discuss their applications:

(i) Real time PCR. (7 marks)

(ii) Reverse Transcription PCR. (6 marks)

(iii) Nested PCR. (6 marks)

(iv) Multiplex PCR. (6 marks)

5. Write an essay on the construction of different types of gene libraries and how they can be screened for genes of interest.

6. Using specific examples, discuss the applications of recombinant DNA technology in agriculture and the impact this technology has had on Africa.

END OF EXAMINATION