JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATIONS

RESIT FOR THE 2019/2020 ACADEMIC YEAR

YEAR, SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (BIOLOGICAL SCIENCES)

COURSE CODE: SBI 3441

COURSE TITLE: BASIC TECHNIQUES IN GENETIC ENGINEERING

DATE **TIME**

DURATION: 2 HOURS

INSTRUCTIONS:

1. **This paper contains two sections (A and B)**
2. **Answer ALL questions in Section A and any Two (2) questions in Section B**
3. **Write ALL answers in the booklet provided**

SECTION A: SHORT ANSWER QUESTIONS (30 MARKS)

1. Explain the significant difference in protocols used for extracting nucleic acids from plant and animal materials. (3 marks)
2. Describe the two main challenges that can be encountered in DNA transformation research. (3 marks)
3. Outline the nucleic acid blotting techniques used for DNA and RNA. (3 marks)
4. Describe the key difference between conventional PCR and reverse transcriptase PCR. (3 marks)
5. Explain the nomenclature system used for restriction endonucleases. (3 marks)
6. Describe how host-controlled restriction and modification systems by restriction enzymes is achieved in bacteria. (3 marks)
7. Determine the frequency of occurrence for restriction sites in a DNA fragment comprised of 50% G+C content if the recognition site for restriction endonucleases is:
    a. 4 base pairs long
    b. 6 base pairs long
    c. 8 base pairs long
8. Describe any three types of naturally occurring plasmids in bacteria. (3 marks)
9. Outline the steps involved in the construction of genomic libraries. (3 marks)
10. Describe the potential role of protoplasts in recombinant DNA technology

SECTION B: ESSAY QUESTIONS (30 MARKS)

11. Give an account of the conventional polymerase chain reaction citing its theoretical principle, key steps, possible resultant DNA fragments and challenges that can be encountered. (20 marks)
12. Discuss the different ways through which DNA fragments can be joined in recombination experiments. (20 marks)
13. Discuss the use of *Agrobacterium tumafaciens* mediated transformation in plants.
14. Discuss the transformation techniques in bacteria other than *E. coli*. (20 marks)