



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND  
TECHNOLOGY**

**UNIVERSITY EXAMINATIONS  
RESIT FOR THE 2019/2020 ACADEMIC YEAR**

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

**COURSE CODE: SBI 3432**

**COURSE TITLE: GENE REGULATION**

**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. Outline any three differences between prokaryotic and eukaryotic gene regulation. (3 marks)
2. Distinguish between positive and negative transcriptional control. (3 marks)
3. Outline three changes in chromatin structure associated with gene expressions. (3 marks)
4. Describe the general structure of an operon. (3 marks)
5. Distinguish between regulons and divergent operons. (3 marks)
6. Explain the role of terminators in transcriptional control. (3 marks)
7. Describe how gene regulation is achieved through the action of antisense RNA. (3 marks)
8. Describe the functions of transcriptional activators in eukaryotes. (3 marks)
9. Explain how gene regulation can be achieved through RNA splicing. (3 marks)
10. Describe how codon usage influences the efficiency of mRNA translation. (3 marks)

**SECTION B: ESSAY QUESTIONS****(40 MARKS)**

11. Using the example of the lac operon, discuss how operons regulate gene expression. (20 marks)
12. Discuss how attenuation regulates the tryptophan operon. (20 marks)
13. Give a synthesis on how alternative sigma factors regulate gene expression during spore formation in *B. subtilis*. (20 marks)
14. Give a synthesis on the general methods used in investigating protein composition and mRNA expressed in different tissues. (20 marks)