



MACHAKOS UNIVERSITY

University Examinations 2019/2020 academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

**FOURTH YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR
BACHELOR OF ENVIRONMENT AND NATURAL RESOURCE MANAGERMENTS
ENS 433 ENVIRONMENTAL BIOTECHNOLOGY**

DATE:

TIME:

INSTRUCTIONS

1. Answer Question 1 (compulsory) and **any two** questions in Section B.
2. Use clean well labelled diagrams wherever appropriate.

SECTION A

QUESTION ONE (30 MARKS)

- a) Briefly discuss THREE KEY scope of enviromental scope (3 marks)
- b) Evaluate three major factors to consider in an in situ microbial biodegradation process (3 marks)
- c) Briefly discuss the attributes of a microorganisms as a key component of a biosensor (3 marks)
- d) Briefly enumerate the coding region of the gene structure (3 marks)
- e) Using an example describe the role of microbial vector in environmental biotechnology
- f) Briefly discuss the following terminologies in the context of environmental biotechnology
 - i. Xenograft
 - ii. Allograft
 - iii. Isograft (3 marks)
- g) Describe at least THREE methods of accessing germline in biotechnology (3 marks)
- h) Describe three bioremediation processes that occur as a result of microbial metabolism (3 marks)
- i) Describe the process involved in the polymerisation of the mRNA (3 marks)
- j) Describe the Three main types of indications in a biomarker (3 marks)

SECTION B

QUESTION TWO (20 MARKS)

Discuss biomarkers and bioindicators and their use in environmental monitoring

QUESTION THREE (20 MARKS)

The following DNA sequence has been extracted from the segment of DNA region that codes for hemoglobin:

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GTGAACGTGGATGAAGTTGGTGGTGAGGCCCTGGGCAGGCTGCTGGTGGTCTACTACA
TGGTGCATCTGACTCCTGAGGAGAAGTCTGCCGTTACTGCCCTGTGGGGCAAGGTGAA
CGTGGATGAAGTTGGTGGTGAGGCCCTGGGCAGGCTGCTGGTGGTCTACCCTTGGACC
CAGAGGTTCTTTGAGTCCTTTGGGGATCTGTCCACTCCTGATGCTGTTATGGGCAACCC
TAAGGTGAAGGCTCATGGCAAGAAAGTGCTCGGTGCCTTTAGTGATGGCCTGGCTCAC
CTGGACAACCTCAAGGGCACCTTTGCCACACTGAGTGAGCTGCACTGTGACAAGCTGC
ACGTGGATCCTGAGAACTTCAGGCTCCTGGGCAACGTGCTGGTCTGTGTGCTGGCCCA
TCACTTTGGCAAAGAATTCACCCACCAGTGCAGGCTGCCTATCAGAAAGTGGTGGCT
GGTGTGGCTAATGCCCTGGCCCACAAGTATCACTAATATCAGAAAGTGGTGGCTGGTG
TGGCTAATGCCCTGGCCCACAA
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Study, deduce and discuss the following: the opening reading frame, its amino acid sequence in relation to its structure.

QUESTION FOUR (20 MARKS)

Discuss the salient features of the genetic codes

QUESTION FIVE (20 MARKS)

Using a diagram discuss a biotechnological remediation process