



MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES

ENS 433: ENVIRONMENTAL BIOTECHNOLOGY

DATE: 8/5/2019

TIME: 11.00-1.00 PM

INSTRUCTIONS

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

SECTION A

QUESTION ONE (30 MARKS)

- a) Evaluate THREE biological components of a biosensor (3 marks)
- b) Outline SIX advantages of microbial - based bioremediation (3 marks)
- c) Describe the interdependence of the three main areas of enzyme catalysis in environmental biotechnology (3 marks)
- d) Describe three bioremediation processes that occur as a result of microbial metabolism (3 marks)
- e) Describe gene structure (3 marks)
- f) Describe using an example the role of microbial vector in environmental biotechnology (3 marks)
- g) Describe the following: (3 marks)
 - i. Xenograft
 - ii. Allograft
 - iii. Isograft
- h) Explain THREE methods of accessing germline in biotechnology (3 marks)
- i) In the context of environmental biotechnology describe any three RNA based nucleotides (3 marks)
- j) Describe the salient features of the genetic codes (3 marks)

SECTION B

QUESTION TWO (20 MARKS)

Discuss biomarkers & bioindicators in environmental biotechnology

QUESTION THREE (20 MARKS)

You have just been employed as the lead environmental officer to design a bioremediation program of a field with excessive pollution of zinc, copper and lead. Describe in a stepwise procedure of the design

QUESTION FOUR (20 MARKS)

- a) Describe using schematic diagram a microbial based bioreactor (10 marks)
- b) Describe any genetic engineering that can be used to clone a transgenic organism. (10 marks)

QUESTION FIVE (20 MARKS)

Discuss the use of plasmids in environmental biotechnology