MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FOURTH YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF ENVIRONMENTAL SCIENCES

ENS 433 ENVIRONMENTAL BIOTECHNOLOGY

DATE: 24/9/2019 **TIME: 8.30-10.30 AM**

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

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) Using an example describe 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

Discuss biomarkers & bioindicators in environmental biotechnology (20 marks)

QUESTION THREE

You have just been employed as the lead environmnetal 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 (20 marks)

QUESTION FOUR

a) Using schematic diagram where possible describe a microbial based bioreactor (10 marks)

b) Discuss any advanced method of waste – water biotreaments (10 marks)

QUESTION FIVE

Discuss the use of plasmids in environmental biotechnology (20 marks)