



## TECHNICAL UNIVERSITY OF MOMBASA

---

FACULTY OF PURE AND HEALTH SCIENCES

DEPARTMENT OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR BACHELOR IN INDUSTRIAL MICROBIOLOGY  
AND BIOTECHNOLOGY

**AAB 4303: PETROLEUM GEOMICR BIOLOGY (PAPER 1)**

**END OF SEMESTER EXAMINATION: APRIL 2016 SERIES**

**TIME**                                **2 HOURS**

**DATE**

### **INSTRUCTIONS TO CANDIDATES**

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

**THIS PAPER CONSISTS OF FIVE QUESTIONS. ATTEMPT QUESTION ONE  
(Compulsory) AND ANY OTHER TWO QUESTIONS.**

**Do not write on the question paper.**

### **QUESTION ONE**

a)(i) Describe the processes that lead to the formation of water mass (8 marks)

(ii) Describe major branches of oceanography

4mks

(b)(i) Define the term Micropaleontology 1 mark

(ii) Describe the morphology of Calcareous foraminifera microfossils 5 marks

(iii) Explain biogenetic origin of petroleum 7 marks

( C ) (i) Identify any three bacterial strains capable degrading petroleum products 3 mark

(ii) State the importance of metallomonas microorganisms in the environment 2 marks

## QUESTION TWO

(a) (i) Explain why bioremediation is relevant tool for rehabilitation of petroleum hydrocarbon contaminated environment 6 marks

(ii) Explain how metallomonas bacteria are capable of corroding metals 5 marks

(b)(i) Describe characteristics of petroleum reservoir 7marks

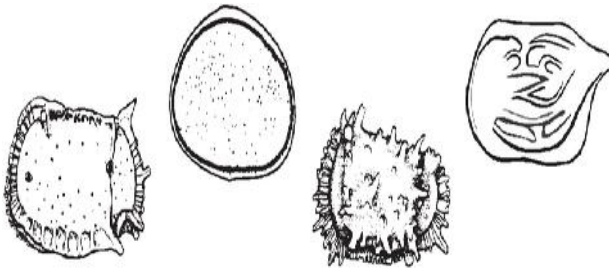
(ii) Distinguish between *insitu* and *exsitu* bioremediation methods 2 marks

## QUESTION THREE

(a)(i) State any cause of acidification in the oceans 1 mark

**Anthropogenic carbon dioxide (CO<sub>2</sub>) emissions into the atmosphere.**

(ii) Identify the microfossils shown below and state their significance in geology 4 marks



(ii) Discuss Palynomorph microfossils' structure and where they are commonly found 6 marks

(b)(i) Explain importance of Pelagic and Benthic regions of the ocean 2 marks

(ii) Describe lentic hydrobiology 5 marks

(iii) Distinguish between biosphere and lithosphere 2 marks

**QUESTION FOUR**

(a)(i) Explain the process of primary oil recovery during petroleum exploration 7 marks

(ii) Discuss the biological methods of controlling petroleum pollution 8 marks

(b) (i) Identify any three fungi genera used in bioremediation of petroleum pollutants 3 marks

(ii) Name any two gases which were abundant in the early development of Earth's atmosphere across geologic time 2 marks

### QUESTION FIVE

(a)(i) Explain various sources of petroleum pollution 8marks

(ii) Other than bacteria and fungi describe any other organisms that are capable of xenobiotic degradation 6marks

(b)(i) State the role of hydrocarbonoclastic microorganisms in the environment 2 marks

(ii) Name the enzyme that introduces oxygen into hydrocarbon when degradation occurs in aerobic condition 1 mark

(iii) Explain importance of biostratigraphy in petroleum exploration 3 marks