

ELIZADE UNIVERSITY

ILARA-MOKIN

ONDO STATE

DEPARTMENT: BIOLOGICAL SCIENCES

B. Sc. DEGREE EXAMINATION

SECOND SEMESTER 2015/2016 SESSION

COURSE CODE: MCB 202

COURSE TITLE: GENERAL MICROBIOLOGY II

DURATION: 2 HOURS

A handwritten signature in black ink, enclosed in a rectangular box. The signature appears to be "E. U. Elu".

HOD's SIGNATURE

NAME:.....MAT. No:

Instructions

- 1. Answer four questions.**
- 2. Begin each answer on a fresh page**

1. (a) Explain the following terms: (i) systematics (ii) nomenclature (iii) Phenetic classification (iv) phylogenetic classification (v) type strains [10 marks]

Calculate the % GC content of these three DNA sequences [6 marks]

Sequence 1: 5' ...ATTTTTGTAGCCTCGCTAGGCTTCACTGCT...3'

Sequence 2: 5' ...GAAATCTCGACTAATCTTCACTAGGATTCT...3'

Sequence 3: 5' ...CGCGGGGTATCCGGGTACGCGCGTCATTTCG...3'

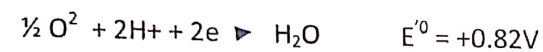
(c) From your result, determine the DNA sequence that will quickly denature into single strands when subjected to high temperature [4 marks]

(ii) Which of the DNA sequences is likely to be from a thermophilic organism and why [5 marks]

2. (a) Define the following: (i) enzyme (ii) co-enzyme (iii) apo-enzyme (iv) ribozyme (v) Allosteric enzyme [10 marks]

(b) Briefly discuss three factors that affect enzymatic activity [6 marks]

(c) Calculate the free energy ΔG change of the following redox reaction [5 marks]



(n = 2 moles of electrons, Faraday's constant $F = 96,480\text{J/mole-Volt}$)

(d) From your answer determine if the reaction is favorable or not and why [4 marks]

3. a (i) Describe the process of biofilm formation [8 marks] a (ii) Compare and contrast a microbial biofilm and a microbial mat [4 marks]

(b) Explain how cells of the same species communicate with each other within a biofilm community [8 marks]

(c) List five economic importance of biofilm [5 marks]

4. (a) Describe how you can test for mutagenic potential of an unknown chemical compound using microorganism [10 marks]

(b) Differentiate between (i) spontaneous and induced mutation (ii) mutagen and carcinogen (iii) prototroph and auxotroph (iv) transduction and conjugation [10 marks]

(c) Outline the four possible fates of foreign DNA fragment (donor DNA) inside a recipient cell [5 marks]

5. (a) Briefly describe the five major nutritional classification of microorganisms [10 marks]

(b) Define the following terms: (i) assimilatory reduction, (ii) dissimilatory reduction (iii) mineralization. [6 marks]

(c) Why is biological nitrogen fixation important? [5 marks] (ii) How can cyanobacteria and algae help in reduction of atmospheric greenhouse gases? [4 marks]

6. (a) Explain the following (i) Viable but non-culturable (VBNC) (ii) labelled probes (iii) Enrichment culture technique [6 marks]
- (b) Outline two ways that can be used to grow "unculturable" microorganisms in the laboratory [4 marks]
- (c) What is the reason for using enrichment culture technique for the isolation of microorganism? [5 marks]
- (d) Define or explain the following terms (i) adaptive mutations (ii) biochemical mutation (iii) housekeeping genes (iv) lethal mutations (v) conditional mutation [10 marks]