

MIC 411



OFFICE OF THE DEPUTY PRINCIPAL  
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

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## UNIVERSITY EXAMINATIONS

### 2020 /2021 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER MAIN EXAMINATION

**FOR THE DEGREE OF BACHELOR OF SCIENCE  
IN MICROBIOLOGY**

**COURSE CODE: MIC 411**

**COURSE TITLE: MICROBIAL GENETICS**

**DATE: 10<sup>TH</sup> MARCH 2021**

**TIME: 9.00 A.M – 12.00 P.M**

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### INSTRUCTIONS TO CANDIDATES

- SEE INSIDE

**THIS PAPER CONSISTS OF 3 PRINTED PAGES**

**PLEASE TURN OVER**

**REGULAR – MAIN EXAM**  
**MIC 411: MICROBIAL GENETICS**

**STREAM: BSc. Microbiology**

**DURATION: 3 Hours**

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**INSTRUCTION TO CANDIDATES**

- i. Answer **ALL** questions from section A and any **THREE** from section B.
- ii. Diagrams should be used whenever they serve to illustrate the answer.
- iii. Do not write on the question paper.

**SECTION A (24 MARKS)**

**Question One**

- a) Define the term a gene. (2 Marks)
- b) Outline the role of the following DNA replication enzymes:-
  - i. DNA polymerase (1 Mark)
  - ii. DNA helicase (1 Mark)
  - iii. DNA primase (1 Mark)
  - iv. Topoisomerase (1 Mark)
- c) Highlight four structural differences between DNA and RNA. (2 Marks)
- d) Outline two advantages of an organism with two sets of chromosomes. (4 Marks)

**Question Two**

- a) Interpret the equation below in relation to quantitative genetics. (4 Marks)  
$$\text{Phenotype} = \text{Genotype} + \text{Environment}$$
- b) Highlight four characteristics of a genetic material. (2 Marks)
- c) Explain Chargaff's principle of base pairing. (3 Marks)
- d) Outline three types of spontaneous mutations. (3 Marks)

**SECTION B (36 MARKS)**

**Question Three**

- a) What is the role of biotechnology in genetics? (2 Marks)
- b) Discuss the steps of bacterial genetic engineering. (10 Marks)

**Question Four**

Discuss the process of DNA replication following the semi-conservative hypothesis. (12 Marks)

**Question Five**

- a) Give an account of the causes of mutations. (6 Marks)
- b) Describe the pre-translational mRNA processing at the end of transcription process. (6 Marks)

**Question Six**

- a) Account for the genetic variations among a particular population species. (6 Marks)
- b) Explain the principle behind the enzyme repression as a mechanism of gene regulation. (6 Marks)

**Question Seven**

Describe steps involved in gene cloning (12 Marks)

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