MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR
SECOND YEAR FIRST SEMESTER

SCHOOL OF PURE APPLIED AND HEALTH SCIENCES
BACHELOR OF SCIENCE IN MICROBIOLOGY AND BACHELOR OF EDUCATION (SCIENCE)

COURSE CODE:BOT 2106
COURSE TITLE: PRINCIPLES OF GENETICS

DATE: 06/12/23 **TIME: 1430-1630 HRS**

INSTRUCTIONS

A. Answer ANY TEN (10) questions.

B. Illustrate your answers with diagrams and give examples where appropriate.

ANSWER ANY TEN (10) QUESTIONS.

1. Outline ways in which chromosomal DNA replication in eukaryotes differ from DNA replication in prokaryotes. **(5 marks)**

2. Define the following terms.
   a. Codominance **(1mark)**
   b. Segregation **(1 mark)**
   c. Allopolyploidy **(1 mark)**
   d. Mutagen **(1 mark)**
   e. Penetrance **(1 mark)**

3. A woman who is a carrier of colorblindness had phenotypically normal parents and is married to a man with normal color vision.
   a) Give the possible genotypes of the woman, her husband and of the parents. **(2 marks)**
   b) Show that half the sons and half the daughters will be color blind**.** **(3 marks)**

4. A woman with type **O** blood gave birth to baby, also with type **O** blood. The woman stated that a man with type **AB** blood was the father of the baby. Is there any merit to her statement? **(5 marks)**

5. Using a diagram, describe the structure of a chromosome. **(5 marks)**

6. Describe the levels of gene regulation in eukaryotes. **(5 marks)**

7. Highlight the principles of recombinant DNA technology. **(5 marks)**

8. Illustrate the initiation complex in protein translation. **(5 marks)**

9. Explain the different types of RNA. **(5 marks)**

10. Outline seven discrete characteristics that Mendel studied. **(5 marks)**

11. Give the roles of mitosis and meiosis in a multicellular organism. **(5marks)**

12. Outline structural and functional differences between DNA and RNA. **(5 marks)**

13. Describe the Hershey-Chase bacteriophage experiment, its results, and the conclusion. **(5 marks)**

14. Discuss chromosomes structural changes. **(5 marks)**

15. Two plants with white flowers, each from true-breeding strains, were crossed. All the F_1 plants had red flowers. When these F_1 plants were intercrossed, they produced an F_2 consisting of 177 plants with red flowers and 142 with white flowers.

a) Propose an explanation for the inheritance of flower color in this plant species. **(2 marks)**

b) Propose a biochemical pathway for flower pigmentation and indicate which genes control which steps in the pathway. **(3 marks)**

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