MAASAI MARA UNIVERSITY

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

SCHOOL OF PURE SCIENCES
MASTER OF SCIENCE IN PLANT PHYSIOLOGY

COURSE CODE: BOT 8112

COURSE TITLE: DEVELOPMENTAL GENETICS

DATE: 31/5/24 **TIME: 1100-1300HRS**

INSTRUCTIONS TO CANDIDATES

1. **ATTEMPT ANY FOUR QUESTIONS QUESTIONS**

QUESTION 1

a) Explain with examples the following mutation terms
    a) Single base substitutions (5 marks)
    b) Missense mutations (5 marks)
    c) Non-sense mutations (5 marks)
    d) Silent mutations (5 marks)
    e) Splice site mutations (5 marks)

QUESTION 2

a) Distinguish between DNA and RNA (5 marks)
b) Describe the agents that disrupt DNA and the different DNA damages caused (10 marks)
c) Describe the methods available in repairing damaged DNA (6 marks)
d) Describe the agents that disrupt hydrogen bonding (4 marks)

QUESTION 3

a) The flow of genetic information is summarized by the central dogma theory. Explain the details of the theory (5 marks)
b) Describe your understanding of the genetic code (5 marks)
c) Describe in detail the process of protein synthesis from DNA (5 marks)
d) Explain your understanding of PCR and RT-PCR, Additionally describe the processes involved in PCR namely; denaturation, annealing, extension giving the names of enzymes involved (10 marks)

QUESTION 4

a) Explain the reasons that Mendel used pea plants to explain about genetics (5 marks)
b) Describe the following Mendelian principles; Principle of segregation, Principle of independent assortment, principle of dominance (15 marks)
c) Discuss the exceptions to Mendelian principles (5 marks)

QUESTION 5

a) Describe the roles of the following enzymes; reverse transcriptase, restriction enzymes, DNA ligase and polymerase enzyme (8 marks)

b) DNA in circular form is said to be supercoiled. Distinguish between negative and positive supercoiling and the role of DNA gyrase and toiposomerases in supercoiling (6 marks)
c) Describe the three types of RNA that exist (6 marks)
d) Discuss about DNA replication with emphasis on prokaryotes and bacteriophage (5 marks)

Question 6

a) Describe with examples nucleotide insertions and deletions (10 marks)
b) Describe nucleotide duplications and their benefits (10 marks)
c) Discuss the 4 bases that make up 4 nucleotides and explain the base pairing rule (5 marks)

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