



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR
FOURTH YEAR SECOND SEMESTER**

**SCHOOL OF PURE APPLIED AND HEALTH
SCIENCES
BACHELOR OF SCIENCE (INDUSTRIAL
MICROBIOLOGY)**

**COURSE CODE: MIC 4216
COURSE TITLE: TECHNIQUES IN MOLECULAR
BIOLOGY**

DATE: 18/4/2024

TIME: 1100-1300 HRS

INSTRUCTIONS

Answer **All** questions in **Section A** and **ANY TWO** in **Section B**

Illustrate your answers with suitable diagrams and give appropriate examples wherever necessary

SECTION A: ANSWER ALL QUESTIONS (30MKS)

1. State the contributions of the following in Molecular Biology. **(3mks)**
 - i) Kary Mullis **(1mk)**
 - ii) Hershy and Chase **(1mk)**
 - iii) Watson and Crick **(1mk)**
2. Distinguish the following terminologies as used in techniques in molecular biology: **(3mks)**
 - i) Cloning and expression vectors **(1mk)**
 - ii) Southern and northern blotting **(1mk)**
 - iii) Enhancers and promoters **(1mk)**
3. Define the following terminologies as used in molecular biology: **(3mks)**
 - i) Vector **(0.5mk)**
 - ii) Palindrome **(0.5mk)**
 - iii) Restriction enzymes **(0.5mk)**
 - iv) Central dogma of molecular biology **(1mk)**
 - v) Primer **(0.5mk)**
4. Explain in what ways chromosomal DNA replication in eukaryotes differ from DNA replication in prokaryotes. **(3mks)**
5. Outline the applications of oligonucleotides. **(3mks)**
6. Explain the principal of DNA extraction. **(3mks)**
7. Describe the various phases of monoclonal antibodies production. **(3mks)**
8. Illustrate thymine dimer excision repair mechanism. **(3mks)**
9. State the functions of protein microarrays. **(3mks)**
10. In the following statements indicate the enzyme that catalyzes each of the steps in the semiconservative replication of DNA in prokaryotes. **(3mks)**
 - a) The formation of negative supercoiling in progeny DNA molecules **(0.5mk)**
 - b)** The synthesis of RNA primers **(0.5mk)**
 - c) The removal of RNA primers **(0.5mk)**
 - d) The covalent extension of DNA chains at the 3'-OH termini of primer strands **(0.5mk)**
 - e) Proofreading of the nucleotides at the 3'-OH termini of primer strands **(0.5mk)**
 - f) Joining of the okazaki fragments **(0.5mk)**

SECTION B: ANSWER ANY TWO QUESTIONS (40MKS)

11. Assuming you are the Kenyan government pathologist, how would you identify the exhumed bodies in the Shaka Hola saga using techniques in molecular biology? **(20mks)**
12. Give a detailed account of the methods of DNA sequencing. **(20mks)**
13. Describe the process of cloning a DNA fragment into the *Pst I* site of the vector **pBR 322**. How would you screen for clones that contain the insert? **(20mks)**
14. Present, with examples controversial issues in biotechnology. **(20mks)**

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