

CHUKA

UNIVERSITY



UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN
MEDICAL PARASITOLOGY

MEPA 860: GENETICS AND MEDICAL MICROBIOLOGY

STREAMS: MEPA

TIME: 3 HOURS

DAY/DATE: FRIDAY 08/08/2025

2.30 P.M. – 5.30 P.M.

INSTRUCTIONS:

- Answer Question ONE and any TWO other questions.

QUESTION ONE (COMPULSORY)

- a) Explain the main post-transcriptional and post-translational modifications in eukaryotes. (10 marks)
- b) Discuss the current understanding of DNA methylation and histone modifications as epigenetic regulators in *Plasmodium falciparum* (10 marks)

QUESTION TWO

- a) Discuss four main mechanism that contribute to antimicrobial/insecticide resistance and how evolution of dominance is applied in disease control. (12 marks)
- b) A flood-affected community reports severe diarrhea caused by *Vibrio cholerae* O1. Explain the molecular action of cholera toxin (CTX) leading to watery diarrhea and the role of **biofilm formation** in *V. cholerae* pathogenesis and transmission. (8 marks)

QUESTION THREE

- a) Compare **allopatric** and **sympatric speciation** using drug-resistant *Plasmodium* strains as examples. (10 marks)

- b) Describe how *Neisseria gonorrhoeae* evades immunity. (10 marks)

QUESTION FOUR

- a) Discuss **four** contributions of Human Genome Project (HGP) advancements to infectious disease management (12 marks)
- b) Explain the mechanism and application of CRISPR-Cas9 system in mosquito control (8 marks)

QUESTION FIVE

Discuss the evolutionary forces that influence gene frequencies in vector populations and analyze their implications for vector control strategies (20 marks)

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