W1-2-60-1-6

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS 2025/2026

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN MOLECULAR MEDICINE

TIM 3101: CELL STRUCTURE AND FUNCTION

DATE: AUGUST 2026 TIME: 3 HOURS

INSTRUCTIONS: Answer ANY FOUR questions. Each question is 25 Marks

Question One

A medical lab discovers a mutation in a patient's cells that affects transcription factors specific to eukaryotic transcription. Explain how this mutation affect gene expression, and what kinds of diseases or dysfunctions could result from such an issue? (25 Marks)

Question Two

When a newly synthesized eukaryotic protein misfolds and is trapped in the endoplasmic reticulum, it triggers specific cellular responses. Discuss the control mechanisms that the cell uses to detect, isolate, and manage this stress response. (25 Marks)

Question Three

a). Describe the key structural differences that distinguish prokaryotic chromosomes from eukaryotic chromosomes (10 Marks)

b). Explain how these distinct structural variations impact and direct the processes of DNA replication, transcription, and translation in these respective organisms. (15 Marks)

Question Four

a). Describe the similarities and differences in the structure and function of the eukaryotic plasma membrane, the endoplasmic reticulum, and the Golgi apparatus. (15 Marks)

b). Detail how these specific organelles cooperate in the synthesis, processing, and secretion of proteins. (10 Marks)

Question Five

Describe the underlying molecular mechanisms and triggers of apoptosis, necrosis, and autophagy (25 Marks)

Question Six

a). Compare the specific functions of initiator caspases (such as caspase-8 and -9) and executioner caspases (such as caspase-3, -6, and -7) during the apoptotic cascade. (10 Marks)

b). Explain why distinguishing between these two caspase categories is crucial for ensuring the orderly and regulated progression of apoptosis. (15 Marks)