



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

THIRD YEAR SUPPLEMENTARY/SPECIAL EXAMINATION FOR
BACHELOR OF SCIENCE (AGRICULTURAL EDUCATION AND EXTENSION)

SBT 300 UNIT NAME: CELL BIOLOGY AND GENETICS

DATE: 17/3/2022

TIME : 2:00 – 4:00 PM

Instructions

1. Answer Question 1 (compulsory) and **any two** questions in Section B.
2. Use clean well labelled diagrams wherever appropriate.

SECTION A

Question 1. – Compulsory (30 marks) –

- i. Briefly describe the structure and functions of the following cell organelles:-
 - (a).Nucleus (1.5 marks)
 - (b). Centrioles (1.5 marks)
- ii. Explain the role of cell cytoskeleton (3 marks)
- iii. Using examples, describe cell motility (3 marks)
- iv. Explain the relationship between the genotype and phenotype of an organism (3 marks)
- v. Explain whether a true breeding individual can make more than one kind of gametes. (3 marks)
- vi. Explain the following mechanisms of speciation:-
 - (a) Geographical isolation (1.5 marks)
 - (b) Reproductive isolation (1.5 marks)
- vii. Explain the sex-determining genes in mammals. (3 marks)
- viii. Differentiate between DNA and RNA (3 marks)
- ix. Differentiate between prophase in meiosis and in mitosis (3 marks)

- x. Describe cell fractionation and explain its importance in cell biology (3 marks)

SECTION B

Question 2

- (a) Describe the mechanisms of gene transfer in a bacterial cell (10 marks)
(b) With an example discuss sex linkage phenomenon in living organisms (10 marks)

Question 3

Discuss Transcription and translation processes in protein biosynthesis (20 marks)

Question 4

Discuss mitotic cell division (20 marks)

Questions 5

- (a). Explain the importance of evolution in speciation (5 marks)
(b). Describe the gene structure (15 marks)