



# MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FOURTH YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN BIOLOGY

SBT 419: CYTOLOGY AND MOLECULAR BIOLOGY

DATE: 22/7/2019

TIME: 2.00-4.00 PM

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## INSTRUCTIONS

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

## SECTION A

### QUESTION ONE

- a) Differentiate between the following terms:-
  - i. Chromosome and gene (1.5 marks)
  - ii. Centromere and telomere (1.5 marks)
- b) Outline the main events in the anaphase stage of mitosis (3 marks)
- c) Explain the significance of interphases in cellular division (3 marks)
- d) Briefly describe the evidences that the genes are located in the Chromosomes (3 marks)
- e) Explain the term tetrad analysis and its importance in inheritance (3 marks)
- f) Briefly describe polyploidy and its implications in organisms (3 marks)
- g) State three abnormalities that arises from aneuploidy in human beings (3 marks)
- h) Distinguish between point and frameshift mutations (3 marks)
- i) Define gene recombination and explain its importance in sexually reproducing organisms (3 marks)
- j) Giving an example explain a genetic marker (3 marks)

**SECTION B**

**QUESTION TWO**

Discuss the types and causes of gene mutation (20 marks)

**QUESTION THREE**

Discuss mitotic division (20 marks)

**QUESTION FOUR**

Describe the types of chromosomal aberrations (20 marks)

**QUESTION FIVE**

Describe the cytogenetic mapping technique of fluorescence in situ hybridization (FISH) and state its applications (20 marks)



# MACHAKOS UNIVERSITY

University Examinations for 2017/2018 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

Fourth Year First Semester Examination for Degree in Bachelor of  
Science in -----

CODE:SBT 419--- UNIT NAME: Cytology and Molecular Biology

Date----- Time -----

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## 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 Differentiate between the following terms:-
  - (a). Allele and gene (1.5 marks)
  - (b). Centromere and telomere (1.5 marks)
- ii Outline the main events in the prophase stage of mitosis (3 marks)
- iii In what aspects does prophase in meiosis differ from that in mitosis (3 marks)
- iv Briefly describe the evidences that the genes are located in the Chromosomes (3 marks)
- v Distinguish between genetic mapping and Restriction Mapping (3 marks)
- vi .Briefly describe the importance of gene recombination in sexually reproducing organisms (3 marks)
- vii. Briefly describe polyploidy and its implications in organisms (3 marks)
- viii. State three abnormalities that arise from aneuploidy in human beings (3 marks)
- ix. Explain frameshift mutation (3 marks)
- x. Describe polymorphism as a genetic marker in individuals of a population in a given species. (3 marks)

## SECTION B

Questions 2

Discuss gene mutation (20 marks)

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Question 3

Discuss meiotic division

(20 marks)

Question 4

Describe the types of chromosomal aberrations

(20 marks)

Question 5

Describe the cytogenetic mapping techniques of flow cytometry and state its applications (20 marks)



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University Examinations for 2017/2018 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

Third Year First Semester Examination for Degree in Bachelor of --  
----- in -----

CODE:SBT 300 UNIT NAME:CELL BIOLOGY AND GENETICS

Date----- Time -----

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## 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) – This question should cut across the entire course content. It should have 10 subsections, each worth a maximum of 3 marks. (objective type questions)

- i. Briefly describe the functions of the following cell organelles:-
  - (a).Golgi apparatus (1 mark)
  - (b). Nucleus (1 mark)
  - (c).vacuole (1 mark)
- ii. Outline the components of cell cytoskeleton (3 marks)
- iii. Explain cell fractionation and its importance in cell biology (3 marks)
- iv. Differentiate between homogenization and sonication (3 marks)
- v. State three differences between DNA and RNA (3 marks)
- vi. Describe the mendelian laws of genetics (3 marks)
- vii. Distinguish the following terms as used in genetics:-
  - (a).Dominant and recessive alleles (1.5 marks)
  - (b)Heterozygous and homozygous individuals (1.5 marks)
- viii. Describe the role of somatic cell division in living things (3 marks)
- ix. Explain the process of crossing over and explain why this process plays an important role in living organisms (3 marks)
- x. Define evolution and explain its influence in speciation (3 marks)

## SECTION B

Questions 2

Discuss protein biosynthesis

(20 marks)

Questions 3

Discuss the various cytological techniques in cell biology

(20 marks)

Questions 4

Describe the mechanisms of gene transfer in a bacterial cell

(20 marks)

Questions 5

Meiosis occurs in two principal phases; describe all the stages through this phase (20 marks)



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DEPARTMENT OF BIOLOGICAL SCIENCES

Third Year First Semester Examination for Degree in Bachelor of ---  
----- in -----

CODE SBT 300 UNIT NAME: CELL BILOGY AND GENETICS

Date----- Time -----

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## 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) – This question should cut across the entire course content. It should have 10 subsections, each worth a maximum of 3 marks. (objective type questions)

- i. Briefly describe the functions of the following cell organelles:-
  - (a). Endoplasmic reticulum (1 mark)
  - (b). Nucleolus (1 mark)
  - (c). Centrosomes (1 mark)
- ii. Explain the role of cell cytoskeleton (3 marks)
- iii. Giving examples, explain cell motility (3 marks)
- iv. Explain how genotype and phenotype of an organism relate to each other (3 marks)
- v. Can a true breeding individual make more than one kind of gametes for a given kind of characteristic. Explain (3 marks)
- vi. Briefly describe the following mechanisms of speciation:-
  - (a) Geographical isolation (1.5 marks)
  - (b) Reproductive isolation (1.5 marks)
- vii. The primary sex-determining genes in mammals is on Y chromosome. Explain (3 marks)
- viii. Outline the components in nucleic acids (3 marks)
- ix. Describe in what aspects the prophase in meiosis differ from prophase in mitosis (3 marks)

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- x. Briefly describe the processes of cell fractionation (3 marks)

## SECTION B

Questions 2

Describe the mechanisms of gene transfer in a bacterial cell (20 marks)

Questions 3

With an example discuss sex linkage phenomenon in living organisms (20 marks)

Questions 4

Discuss mitotic cell division (20 marks)

Questions 5

Describe transcription and translation in protein synthesis (20 marks)