



MURANG'A UNIVERSITY COLLEGE

(A Constituent College of Jomo Kenyatta University of Agriculture and Technology)

DIPLOMA IN APPLIED BIOLOGY

SCHOOL OF PURE AND APPLIED SCIENCES

CLASS: AS/BIO/13D

COURSE CODE: ASB 1308

CYTOLOGY, HISTOLOGY & GENETICS

DATE: 20TH July 2015

TIME: 2HRS

INSTRUCTIONS TO CANDIDATES

This paper consists of two sections; A and B. Answer ALL questions in section A and any THREE questions from section B. Each question in section A carries 4 marks while each question in section B carries 20 marks

SECTION A (40 marks)

Answer ALL the questions in this section

1. Explain accentuators as used in staining technique. Give examples (4mrks)
2. Describe the structure of chloroplasts (4mrks)
3. On being put in an acidic solution for decalcification, an animal tissue swells significantly.
Explain this observation (4mrks)
4. Outline the procedure for flattening out sections using the hot plate method. (4mrks)
5. Distinguish an onion epidermal cell from a cheek epithelial cell (4mrks)
6. Describe the process of making a temporary whole mount of a unicellular organism like Amoeba (4mrks)
7. i) State two uses of yeast in biotechnology (2 marks)
ii) Describe Co-dominance in genes . Give one example (4 marks)
8. i) Distinguish between gene and chromosome mutation (1 mark)
ii) Describe three types of chromosome mutations (3 marks)
9. In dogs dark coat colour is dominant over albino, and short hair is dominant over long hair.
If these effects are caused by two independently segregating genes, write the most probable genotypes of the offspring when a dark haired dog is mated with an albino long haired dog.
Use the symbol C for the coat colour and S for the length of the hair (4 marks)

10. a) Define epistasis (2 marks)
 b) Explain Mendel's second law (2 marks)

SECTION B (60 marks)

Answer any THREE questions from this section

11. a) Outline the procedure for measuring the size of an onion epidermal cell already mounted using stage and ocular micrometers. (15marks)
 b) Describe dehydration in tissue processing (5marks)
12. a) Write brief notes on dark field illumination (8marks)
 b) Outline the technique for mounting a stained tissue section on a glass slide from xylene (4marks)
 c) Two plant cells A and B were placed adjacent to one another. Cell A had an osmotic potential of -13bars (Ψ_{TTA}) and pressure potential (Ψ_{pA}) of +16 bars. Cell B had osmotic potential (Ψ_{TTB}) of -9 bars and pressure potential (Ψ_{pB}) of +7bars.
 i) Determine water potential difference between the two cells (4marks)
 ii) Calculate the water potential difference between the two cells (4 marks)
13. In Mendel's experiments he crossed a pure breeding tall plant with purple coloured flowers with a dwarf plant with white flowers. All the F₁ were tall with purple flowers. Using T and C to represent the dominant alleles for tallness and purple respectively, what phenotype is expected in the F₂ generation, if he selfed the F₁ (10 marks)
 b) How would you differentiate a male Drosophila from a female one (2 marks)
 c) Define lethal genes. (2 marks)
 d) State Mendel's first law. (2 marks)
 e) A woman has a haemophilic son and three normal sons
 i) Explain her genotype and that of her husband with respect to this gene (2marks)
 ii) Suggest the possibilities of this woman having a haemophilic daughter (2 marks)
14. a) Explain three categories of genes in humans that may have different effects depending on the individual's gender. Give specific examples (12 marks)
 b) Draw a labeled diagram of a t-RNA (8 marks)
15. a) Differentiate between mitosis in plant and animal cells. (4 marks)
 b) Explain the significance of Mitosis (10 marks)
 c) Compare and contrast prophase and anaphase stages of mitosis and meiosis (6 marks)