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/14D
COURSE CODE: ASB 1109
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. a) Using a microscope whose objective lens was x20 and an eye piece x 10, a student counted 1000 red blood cells within the field of vision. He changed to a second objective lens and was able to count only 200 red blood cells. Work out the magnification of the second objective lens (2marks)
   b) Distinguish an organ from a system citing examples in each case (2marks)
2. List any four important equipments used in a histology laboratory (4marks)
3. A straight strip was cut from a pawpaw leaf stalk and placed in distilled water for one hour
   a)Explain what happened to the stalk (3marks)
   b) define the process involved in producing the results (1mark)
4. Define Histology and outline on its importance in the modern world? (4marks)
5. Distinguish an onion epidermal cell from a cheek epithelial cell (4marks)
6. a) Define 'biological catalyst' (1mark)
   b) Explain 'active transport' across the plasma membrane (3marks)
7. Explain the principal of gene mapping (4 marks)

8. Differentiate between

a) Genotype and Phenotype

b) Testcross and Back cross (4 marks)

9. Using an example describe how multiple allele inheritance works (4 marks)

10. A true breeding red flowered plant was crossed with a true breeding white flowered plant.All the F1 were pink. When the F1 was selfed three phenotypes were produced; 1 red, 2 pink, 1 white

i) Using your choice of symbols, suggest the genotype of the parents (2 marks)

ii) Explain the likely type of inheritance (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. (15mrks)
    b) Describe stropping of a microtome knife (5marks)
12. Outline the procedure for determining the osmotic pressure of cell sap of onion epidermal cells using the following;
    - Microscope
    - Razor blade
    - specimen tubes with stoppers
    - Distilled water
    - Sucrose solution i.e. 0.3m,0.35m,0.4m,0.5m,1.0m
    - Onion bulb (20marks)
13. Write brief notes on the following histological techniques
    a) Teased Technique (5marks)
    b) Squash preparation (5marks)
    c) Smear Technique (5marks)
    d) Frozen Method (5marks)
14. a) In one of Mendel's experiments, he crossed a pure breeding tall plant processing coloured flowers with a dwarf plant processing white flowers. All F_1 were tall with coloured flowers.
    Using T and C to represent the dominant Alleles for tallness and coloured respectively, what phenotypic ratio is expected in the F_2 generation if he self crossed the F_2. (10 marks).

    b) State Mendel's Second Law (2 marks)

    c) Define Lethal genes and with the use of a cross give one example

    of a lethal gene. (4 marks)

d) A woman has a haemophiliac son and three normal sons

i) Explain her genotype and that of her husband with respect to his genes. (2 marks)

ii) Suggest the possibilities of this woman having a haemophiliac daughter (2 marks)

15. In maize the genes for coloured seeds and full seeds are dominant to the genes for colourless and shrunken seeds. Pure breeding strains of the double dominant variety and a test cross of the F1 generation produced the following offsprings

Coloured Full Seeds	380
Colourless Shrunken Seeds	396
Coloured Shrunken	14
Coloured Full Seeds	10

i) Explain the results (10 marks)

ii) Calculate the cross over frequency (4 marks)

iii) A normal woman and a normal man produce the following offspring; 3 normal boys and 1 Albino girl. Explain the results using a cross (6 marks)