

Name: \_\_\_\_\_

Index No.: \_\_\_\_\_ / \_\_\_\_\_

2404/302

**CYTOLOGY, HISTOLOGY AND  
GENETICS**

Oct./Nov. 2013

Time: 3 hours

Candidate's Signature: \_\_\_\_\_

Date: \_\_\_\_\_



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

**DIPLOMA IN APPLIED BIOLOGY**

**CYTOLOGY, HISTOLOGY AND GENETICS**

**3 hours**

**INSTRUCTIONS TO CANDIDATES**

*Write your name and index number in the spaces provided above.*

*Sign and write the date of the examination in the spaces provided above.*

*You should have scientific calculator for this examination.*

*This paper consists of TWO sections: A and B.*

*Answer ALL the questions in Section A and any THREE questions from Section B in the spaces provided in the question paper.*

*Each question in section A carries 4 marks while each question in Section B carries 20 marks.*

*Maximum marks for each part of a question are indicated.*

*Candidates should answer the questions in English.*

**For Examiner's Use Only**

Section	Question	Maximum Score	Candidate's Score
A	1-10	40	
B		20	
		20	
		20	
Total Score			

**This paper consists of 20 printed pages.**

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

SECTION A (40 marks)

Answer ALL the questions in this section in the spaces provided.

1. (a) Explain how darkfield microscopy reduces the amount of light entering the lens. (2 marks)

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- (b) Name the parts in an electron microscope involved in:

(i) electron production. (1 mark)

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(ii) directing electrons towards the stage. (1 mark)

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2. Differentiate between mitosis in plant and animal cells. (4 marks)

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3. Two plants cells A and B which are adjacent have water potential ( $\psi$ ) - 800 kpa and -650 kpa respectively.

(a) Name the cell with the higher water potential. (1 mark)

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(b) Explain the water diffusion across the two plant cells. (2 marks)

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(c) Calculate the  $\psi$  at equilibrium. (1 mark)

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4. Explain how:

(a) a cell may reduce its production of metabolite. (2 marks)

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(b) the effect of increasing substrate concentration on an enzyme differs in irreversible inhibitor from that of allosteric inhibitor. (2 marks)

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5. State:

(a) the fault that may be observed in sections which have undergone inadequate impregnation. (1 mark)

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(b) the remedy in 5(a) above. (3 marks)

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6. State the advantages and disadvantages of Lenchart embedding iron. (4 marks)

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7. State the constituents of:

(a) Bouin's fluid fixative.

(2 marks)

(b) Carnoy's fluid fixative.

(2 marks)

8. Figure 1, below, shows the gene loci of 12 alleles situated on a pair of chromosomes.

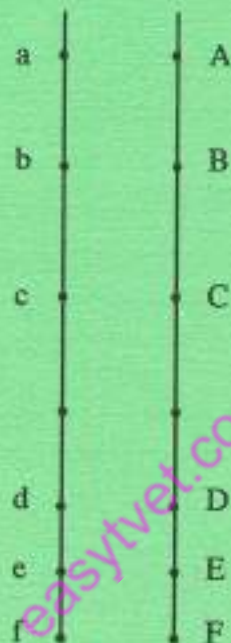


Fig. 1

(a) State the terminology used to describe the chromosomes shown in figure 1.

(1 mark)

(b) Suggest, with reasons, the two gene Loci where crossing-over is likely to occur.

(3 marks)



9. In fowl, the colour of feathers is controlled by 2 sets of genes, including the following:

W (white) dominant over (w) (other colours)

B (black) dominant over (b) (brown)

The heterozygote F1 genotype  $WwBb$  is white. Account for this type of gene interaction.

(4 marks)

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10. (a) Write the genotype of Klinefelter's syndrome condition. (1 mark)

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(b) Describe the phenotypic abnormalities resulting from Klinefelter's syndrome. (3 marks)

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**SECTION B: (60 marks)**

Answer any **THREE** questions in this section in the spaces provided at the end of question 15.

11. Compare and contrast the process of mitosis and meiosis. (20 marks)

12. Discuss the significance of cell wall in plants. (20 marks)

13. (a) Describe the cris-du-chat syndrome. (5 marks)

(b) Illustrate the genetic inheritance of haemophilia from two carrier parents. (15 marks)

14. (a) State the importance of the boiling phase in beer making. (5 marks)

(b) Describe the process of cheese production. (15 marks)



