

2914/204

BIOCHEMISTRY AND GENETICS

June/July 2020

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN APPLIED BIOLOGY

MODULE II

BIOCHEMISTRY AND GENETICS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Non-programmable scientific calculator.

This paper consists of TWO sections; A and B.

Answer ALL the 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.

Maximum marks for each part of a question are indicated.

Candidates should answer the questions in English.

This paper consists of 3 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 questions in this section.

1. State **one** function of each of the following enzymes in DNA replication:
 - (a) DNA ligase; (1 mark)
 - (b) DNA polymerase; (1 mark)
 - (c) DNA binding proteins; (1 mark)
 - (d) helicases. (1 mark)
2. Calculate the number of different combinations of chromosomes in an organism with a diploid number six (6). (4 marks)
3. A test-cross of the F_1 generation in a maize breeding experiment produced the following results:

Coloured, full seed	380
Colourless, shrunken seed	396
Coloured, shrunken seed	14
Colourless, full seed	10

Calculate the distance on a genetic map between the genes for seed colour and seed shape. (4 marks)
4. Identify **four** possible chromosome numbers of an aneuploidy condition. (4 marks)
5. Using examples, differentiate between sex-linked and sex-limited characteristics. (4 marks)
6. (a) Differentiate between a sugar and a starch. (3 marks)
(b) Name the carbohydrate stored in animals. (1 mark)
7. Describe the formation of a peptide bond. (4 marks)
8. State **four** properties of fat soluble vitamins. (4 marks)
9. Highlight **four** functions of vitamin C in human beings. (4 marks)
10. (a) Define the term 'fouling' as used in membrane filtration. (2 marks)
(b) Name **two** types of fouling. (2 marks)

SECTION B (60 marks)

Answer any THREE questions from this section.

11. (a) Outline the process of transcription in protein synthesis. (10 marks)
- (b) Distinguish between ribonucleic acid (RNA) and deoxyribonucleic acid (DNA). (10 marks)
12. Describe proteins with respect to:
- (a) properties; (12 marks)
- (b) functions. (8 marks)
13. Describe ten properties of water and their significance to life. (20 marks)
14. (a) Describe gene mutations under each of the following:
- (i) meaning; (2 marks)
- (ii) types. (12 marks)
- (b) Explain why gene mutation effects are not very common in human beings. (6 marks)
15. (a) State three advantages and three disadvantages of inbreeding in plants. (6 marks)
- (b) Explain seven objectives of plant breeding. (14 marks)

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