2404/304
BIOCHEMISTRY, ANATOMY AND
PHYSIOLOGY
June/July 2018
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN APPLIED BIOLOGY

BIOCHEMISTRY, ANATOMY AND PHYSIOLOGY

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Scientific calculator (battery operated).
*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 5 printed pages.

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

Turn over

SECTION A (40 marks)

*Answer **ALL** the questions in this section.*

1. (a) Give **four** functions of carbohydrates. (2 marks)

   (b) Name the **two** classes of monosaccharides based on the characteristic carbonyl group. (2 marks)

2. Differentiate between transcription and translation in protein synthesis. (4 marks)

3. Interpret the following observations in colour encountered in gastric juice analysis from various patients:

   (a) brownish;

   (b) greenish;

   (c) yellow;

   (d) red. (4 marks)

4. Draw a labelled diagram of a motor neuron. (4 marks)

5. (a) Name any **four** types of synovial joints. (2 marks)

   (b) Distinguish between abduction and adduction joint movement. Give examples in each case. (2 marks)

6 Outline the developmental stages of the human embryo after fertilization to the fourth day. (4 marks)

7. (a) List the structure in order of sequence through which sperm passes from the site of production to the site of fertilization of an ovum. ($3\frac{1}{2}$ marks)

   testis → penis → vagina → ovary

   (b) Name the structure in testis within which meiosis takes place. ($\frac{1}{2}$ mark)

   seminiferous tubules

8. Give the functions of:

   (a) Hydrochloric acid in the stomach; (2 marks)

   (b) Pyloric sphincter. (2 marks)

9. Relate the adaptation of the proximal convoluted tubules to its function. (4 marks)

   long for maximum reabsorption of salts

Sucrose glucose fructose galactose

10. The equation below represents oxidation of a lipid:

$C_{57}H_{104}O_6 + 80\,O_2 \longrightarrow 57\,CO_2 + 53\,H_2O + \text{energy}$.

(a) Calculate the respiratory quotient (RQ). (2 marks)

(b) Suggest an explanation of each for the following:

(i) the (RQ) of germinating maize grown is 1. (1 mark)

(ii) The (RQ) of a normal healthy person varies over 24 hour period. (1 mark)

SECTION B (60 marks)

*Answer any **THREE** questions from this section.*

11. (a) Give the differences between cellulose and glycogen. (10 marks)

(b) Figure 1 shows the structure of a lipid molecule.

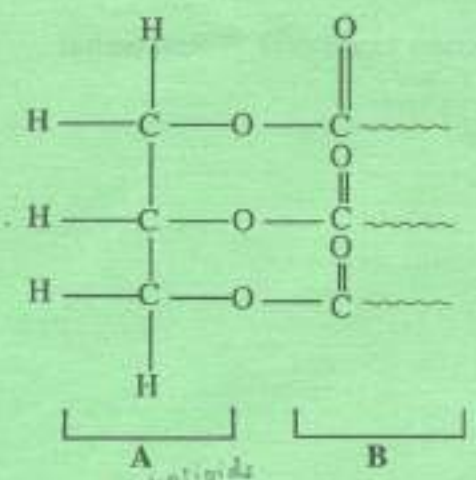

Fig. 1

(i) identify parts labelled A and B;

(ii) identify this type of a lipid;

(iii) identify the chemical reaction used to form the bonds between A and B. (3 marks)

(c) (i) Give **one** function of this type of lipid in living organisms.

(ii) Identify the characteristics in the above type of lipid and that makes it suitable for its functions. (7 marks)

12. (a) Compare and contrast fibrous and globular protein giving specific examples in each case. (12 marks)

(b) (i) List the components of a nucleotide;

(ii) differentiate between DNA and RNA. (8 marks)

13. (a) With the aid of a diagram, illustrate the internal structure of the adrenal gland. (8 marks)

(b) Summarize the functions of hormones secreted by the anterior pituitary gland. (12 marks)

14. (a) Explain how:

(i) aphids can be used to investigate the functions of phloem; (5 marks)

(ii) the movement of K^+ ions account for the opening of the stomata; (11 marks)

(iii) K^+ ions are moved against concentration gradient. (4 marks)

15. (a) Draw a labelled diagram of the transverse section through the ileum as observed under a low magnification. (8 marks)

(b) Explain how the structure of the wall of the small intestine is adapted for its function. (12 marks)

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