THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN NUTRITION AND DIETETICS

MODULE II

BASIC BIOCHEMISTRY AND INTRODUCTION TO BIOSTATISTICS

3 hours

INSTRUCTIONS TO CANDIDATES

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 answer booklet provided.
Each question in section A carries 4 marks, while each question in section B carries 20 marks.
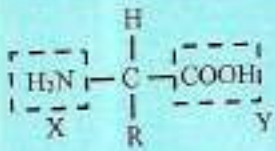*Maximum marks for each part of a question are indicated.*
Candidates should answer the questions in English.

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.

SECTION A (40 marks)

Answer ALL questions in this section.

1. Classify vitamins based on solubility giving specific examples. (4 marks)

2. Outline the classes of biomolecules with the following biological functions:

   (a) control and informative; (2 marks)

   (b) enzymatic functions. (2 marks)

3. (a) Below is a component found in living organisms.

   Identify the functional groups:

   (i) X: _____ (1 mark)

   (ii) Y: _____ (1 mark)

   (b) Distinguish between essential and natural amino acids. (2 marks)

4. (a) Explain the use of zymogen in digestion of proteins (dietary). (2 marks)

   (b) Define 'isoenzyme' as used in metabolism. (2 marks)

5. Describe the storage and utilization of triacylglycerol in the human body. (4 marks)

6. Outline **two** benefits of using Epi info as a statistical analysis tool. (4 marks)

7. (a) Distinguish between discrete variable and continuous variable. (2 marks)

   (b) Outline **two** features of statistical data. (2 marks)

8. (a) In a group of 4 students, the mean mark obtained by 3 students is 60. The total marks for the 4 students is 230. Calculate the marks obtained by the 4th student. (2 marks)

   (b) Highlight **two** disadvantages of mode as a measure of central tendency. (2 marks)

9. (a) The mean of a distribution is 120 while the standard deviation is 4. Determine the coefficient of variation. (2 marks)

   (b) Identify **two** areas where range may be used in quality control. (2 marks)

10. (a) During the month of May 2022, the number of dieticians attending a course increased from 20 to 80. Calculate the percentage change. (2 marks)

(b) In a hospital, the ratio of salaries of doctors to those of nurses is 19:1. The hospital has 5 doctors and 10 nurses. The hospital has allocated Ksh 1,000,000 for additional allowances to the staff. Calculate additional allowance to a:

    (i) doctor;

   (ii) nurse. (2 marks)

SECTION B (60 marks)

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

11. (a) (i) Explain why DNA replication is said to be semi-conservative. (2 marks)

    (ii) Complete the following table with reference to comparison between replication and transcription of nucleic acids. (6 marks)

	Replication	Transcription
Template	Double strands	Single strands
Substrate	dNTP	NTP
Enzyme	—	—
Product	—	—
Base pair	—	—
Genome	Whole genome	Part of the genome

(b) Name any **four** types of histone proteins. (4 marks)

(c) Amplification of nucleic acid molecules is done via Polymerase Chain Reaction (PCR). Outline the various applications of PCR technology. (8 marks)

12. (a) Below is a polymer of glucose found in cells.
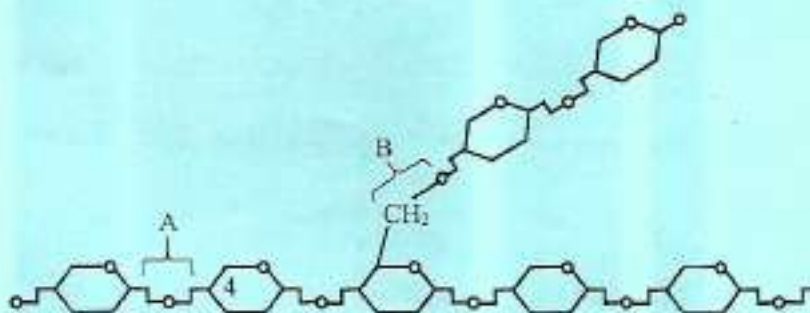
(i) Name the linkages:

A;

B. (1 mark)
(1 mark)

(ii) Name this compound in:

(I) animal cells;
(II) plant cells. (1 mark)
(1 mark)

(b) (i) Distinguish between epimers and anomers in monosaccharides. (4 marks)

(ii) Outline any **four** classes of general groups of monosaccharides based on the number of carbon atoms. (4 marks)

(c) Highlight **four** biological functions of polysaccharides. (8 marks)

13. (a) (i) Define Respiratory Quotient. (2 marks)

(ii) Describe the Basal Metabolic Rate (BMR). (8 marks)

(b) Explain **five** benefits of sampling over census in collecting data. (10 marks)

14. (a) The following are the ages of farmers (X) and their medical expenses (Y) per month.

Age in years (X)	Medical expenses in Ksh (Y)
10	16
15	20
24	25
40	36
60	200
68	500
70	520
75	600

(i) Using the least squares method, determine the regression equation. (9 marks)

(ii) Using the equation in (i) above, estimate the medical expense of a farmer aged 80 years.

(1 mark)

(b)   A college has 2 boilers; BBI and BBII. The probability that BBI will have broken down in 5 years time is 0.4 while that of BBII is 0.3. Determine the probability that in 5 years time:

   (i)   both boilers will have broken down.   (3 marks)

   (ii)   at least one boiler will be functioning.   (3 marks)

(c)   The weights and number of patients suffering from diabetes in a given village are given below. The mean weight is 52 kg.

Weigh (kg)	No. of patients
1 - 20	2
21 - 30	8
31 - 35	15
36 - 45	26
46 - 50	30
51 - 60	40
61 - 74	56

Calculate the mean deviation.   (4 marks)

15.   (a)   Highlight **four** sources of secondary data.   (4 marks)

      (b)   A diploma student in nutrition obtained the following marks in 5 subjects.

Subject	Marks (%)
A	80
B	40
C	50
D	70
E	60

Present the above information in a pie chart.   (10 marks)

      (c)   Ten percent (10%) of pancakes made in a bakery turn out to be defective. Find the probability that in a sample of 20 pancakes picked at random, exactly 3 will be defective using the binomial distribution method.   (6 marks)

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