2407/303
CHEMICAL PATHOLOGY
Oct./Nov. 2017
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

CHEMICAL PATHOLOGY

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 4 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. Define the following terms: (4 marks)

    (a) androgens;
    (b) polyphagia; — *eat too much*
    (c) anion gap;
    (d) chyluria. — *chyle in urine*

2. List any **four** causes of increased cerebrospinal fluid globulins. (4 marks)

3. (a) Explain the principle of electrophoresis. (3 marks)

    (b) Name any **two** sample fluids which can be analyzed by electrophoresis. (1 mark)

    — Blood
    — CSF

4. (a) State the roles of Vitamin D in the regulation of calcium level. (2 marks)

    (b) List **two** advantages of ion selective electrodes over flame photometry in the measurement of electrolytes. (2 marks)

    — fast
    — Easy to perform

5. Fill the table below: (4 marks)

	Hormone	Source	Biological effect
(i)	prolactin		
(ii)	calcitonin		
(iii)	gastrin		
(iv)	aldosterone		

6. (a) Differentiate between glucagon and glucagonoma. (2 marks)

    (b) State any **four** characteristic features of diabetic ketoacidosis. (2 marks)

7. Explain the detection of beta-hydroxybutyric acid in a urine specimen. (4 marks)

urine is heated to convert acetoacetic acid to acetone. The acetone is then evaporated. The remaining beta hydroxybutyric acid is converted to acetone and then the Rothras test is performed where the rothras reagent in an alkaline medium reacts with acetone to form a violet color.

8. An arterial blood gases analysis yielded the following readings:

    pH   =   6.8
    SO_2 =   70%
    PO_2 =   16 mmHg
    PCO_2 =   80 mmHg
    HCO_3^- =   28 mmol/l
    Na^+ =   146 mmol/l

    Interprete the above test results. (4 marks)

9. A mixture of equal volumes of 0.1 M $NaHCO_3$ and 0.1M H_2CO_3 shows a pH of 6.1. Calculate the Pka of H_2CO_3. (4 marks)

10. (a) Define occult blood. — *blood in stool but cannot be seen* (2 marks)

    (ii) Name any **four** normal constituents of gastric juice. (2 marks)

SECTION B: (60 marks)

Answer any THREE questions from this section.

11. (a) State **seven** effects of cortisol on protein and intermediary metabolism. (7 marks)

    (b) Outline **five** causes of hypo-albuminaemia. *low intake of proteins. Defect in break down of Proteins Hepatitis* (5 marks)

    (c) State **eight** causes of hypernatraemia. *High intake of sodium chloride High intake of drugs rich in sodium. Kidney failure -Ageing Burns -Nephritis* (8 marks)

12. (a) Explain **five** mechanisms that can lead to hyperbilirubinaemia and jaundice. *— Kidney failure — Bleeding = Increased haemolysis. — Infection. — Autoimmunity* (10 marks)

    (b) Distinguish between graves disease and wolf-chalkoff effect. (6 marks)

    (c) Explain any **four** functions of plasma proteins. (4 marks)

13. (a) Outline the steps followed in performing the oral glucose tolerance test. (8 marks)

    (b) State the expected blood levels of the following analytes for a patient with uncontrolled type two diabetes mellitus: (8 marks)

        (i) Ketones;
        (ii) Glycosylated haemoglobin (HbA_{IC});
        (iii) C-peptide;
        (iv) Triglycerides.

    (c) Distinguish between proteinuria and microalbuminuria. (4 marks)

14. (a) Draw a flow diagram to illustrate the urea cycle. (11 marks)

(b) Describe the principle of uricase method for the measurement of uric acid.

(5 marks)

(c) The measurement of creatinine is more effective than urea in the assessment of renal function. Give **four** reasons. (4 marks)

15. (a) Explain the **three** stages involved in urine formation process. ~~Filtration~~ (9 marks)
~~Absorption~~
~~hydrogenation~~

(b) Distinguish between osmolarity and specific gravity. (5 marks)

~~Osmolarity — number of osmoles per litre of the solute~~

(c) Outline the **six** assay conditions which must be considered in enzymatic test methods.
(6 marks)

~~Alkaline phospat~~

~~Aspartate aminotransferase~~

~~Alanine amin~~

THIS IS THE LAST PRINTED PAGE.