Technical University of Mombasa

Faculty of Engineering and Technology

DEPARTMENT OF MEDICAL ENGINEERING

DIPLOMA IN MEDICAL ENGINEERING
(DME Y3 S2)

ECL 2304
HOSPITAL LABORATORY EQUIPMENT

END OF SEMESTER EXAMINATIONS

SERIES: DECEMBER, 2013
TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

-This paper consists of **FIVE** questions
-Question **ONE** is **COMPULSORY**
-Attempt **ANY TWO** questions.
This paper consists of **3 PRINTED** pages

QUESTION ONE

(a) (i) State the Beer-Lambert Law.

(ii) With the aid of diagram formulate a maintenance schedule for flame photometer. **(13 marks)**

(b) (i) With an aid of labeled diagram explain the principle of operation of a double-beam optical system of a calorimeter

(ii) A 0.160 M of sample gives an absorbance of 0.38 at 505nm in a given cell. Determine the concentration of a solution to give an absorbance of 0.45 in the cell of photometer. **(13 marks)**

(c) Differentiate between bacterial incubation and bacterial culture **(4 marks)**

QUESTION TWO

(a) (i) State any **THREE** sources of treatment errors that may affect measurements of cell concentration when using cell counters.

(ii) Outline the routine measure that must be taken to avoid the errors in a (i) **(6 marks**

(b) The following symptoms were encountered in a flame photometer:-

(i) Flame shows separate cones and cannot be adjusted**.**

(ii) Varying readings

(iii) Large Flame turning yellowish

(iv) No deflection or readings

State **ONE** cause and **ONE** remedy of the following faults. **(8 marks)**

(c) Explain the principle of operation of a flame photometer. **(6 marks)**

QUESTION THREE

(a) With reference to a water deionizer explain

(i) The ion exchange process using the relevant equations.

(ii) Explain the cause of blocked resin bed in (a) and give a remedy.

(iii) State how the cause in (ii) can be prevented. **(10 marks)**

(b) (i) Explain the difference between the terms 'SLOPE' AND 'OFF SET' as applied in Hydrogen Potential measurement (PH)

(ii) With the aid of a potentiometric chair diagram of an electrode equipment, explain its principle of operation. **(10 marks)**

QUESTION FOUR

(a) Explain the operational differences of the preparative and analytical types of centrifuges **(8 marks)**

(b) With the aid of a labeled blocked diagram, explain how electronic speed control of a centrifuge is achieved. **(12 marks)**

QUESTION FIVE

(a) Outline any **TWO** principles used in blood cell analysis. **(6 marks)**

(b) With the aid of a labeled blocked diagram, explain the principle of operation of a spectrophotometer. **(12 mark**

(c) Outline any **TWO** common causes of malfunction of spectrophotometer. **(2 marks)**