AMREF INTERNATIONAL UNIVERSITY

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF COMMUNITY HEALTH

DIPLOMA IN COMMUNITY HEALTH PRACTICE

END OF SEMESTER EXAMINATION JAN/APRIL 2024

UNIT CODE: DCHP 119

UNIT NAME: BASIC MATHEMATICS

DATE: 8th April 2024

TIME: **Time: 2 hours** **4.30 PM ------ 6.30 PM**

INSTRUCTIONS

1. This exam is marked out of 60 marks
2. This Examination comprises **TWO** Sections
   Section A: Compulsory Question (20 marks)
   Section B: Long Answer Questions (40 marks)

SECTION A: ATTEMPT ALL QUESTIONS (20 MARKS)

1. Solve for x in the equation.

   $9^{(2x-1)} \times 3^{(2x+1)} = 243$
   (3marks)

2. Solve the following matrix $\begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \end{bmatrix} \times \begin{bmatrix} -3 & 3 & 6 \\ 0 & -2 & -3 \\ 4 & 3 & 1 \end{bmatrix}$
   (4marks)

3. Given that sin (2Θ + 30) = Cos (Θ - 60). Find the value of tan Θ to two decimal places. (3 marks)

4. The *n*th term of an arithmetic progression is $5 - 6n$. Find the first term and the common difference. (3marks)

5. Find the emainder when $x^3 - 5x^2 + 2$ is divided by $2x + 1$. (3mks)

6. Arectangular box with an open top has a volume of $5m^3$. The length of the base is thrice the width. Material for the base costs Ksh. 4 per square metre while material for the sides costs Ksh. 2 per square metre. Express the cost of the material of the box as a function of the width of the base. (4mks)

SECTION B: ANSWER <u>ANY TWO (2)</u> QUESTIONS (40 Marks)

7. In a certain community health center, there are 5 nurses and 4 doctors available for duty. A team of 3 healthcare professionals is selected randomly to conduct a health awareness program. If the team is selected with replacement,

a) Draw a tree diagram to represent this information.
   (4marks)
b) Find the probability of getting two nurses and one doctor on duty. (2marks)
c) Find the probability of getting three nurses or three doctors on duty (2marks)
d) Find the probability of getting only one doctor on duty.
   (2marks)

b. If A= $\begin{bmatrix} 2 & -1 & 0 \\ 0 & -2 & 1 \\ 1 & 0 & 1 \end{bmatrix}$ and B= $\begin{bmatrix} -2 & 1 & -1 \\ 1 & 2 & -2 \\ 2 & -1 & -4 \end{bmatrix}$ show that AB= BA (10marks)

8. A pet store keeper track of the purchases of customers over a four hour period. The store manager classifies purchases as containing a dog product, a cat product, fish product or product of different kind of pet. She found out that:
83 purchased a dog product
101 purchased a cat product
22 purchased a fish product
31 purchased a dog and a cat product
8 purchased a dog and a fish product
10 purchased a cat and a fish product
6 purchased a dog, a cat and a fish product
34 purchased a product for a pet, other than a dog, cat or fish
   a. Use a Venn diagram to represent this information. (6marks)
   b. How many purchases were for a dog product only? (2marks)
   c. How many purchases were for a cat product only? (2marks)
   d. How many purchases were for a dog or a fish product? (3marks)
   e. How many purchases were there in total? (3marks)

b. At a poultry farm, six hens and one duck cost Ksh. 8,000, while four hens and three ducks cost Ksh. 7,200. What is the cost of each type of bird? (4 Marks)

9. The sum of the first 3 terms of an arithmetic series is 21 and the sum of the next three terms is 66.
   i. Find the value of the first term and the common difference. (4 Marks)
   ii. Write an expression for the nth term of the series (2 marks)

   iii. b) A lecture room measures (x + 2) m by (x – 5) m. If the area of the classroom is $60m^{2.}$ Find its length. (4marks)

   b. Solve the following simultaneous equation: (10 Marks)

$$p + q + 5 = 0$$

$$p^2 = q^2 + 5$$