PRESIDENT'S OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

DAR ES SALAAM REGION

FORM FOUR MOCK EXAMINATION 2024

BASIC MATHEMATICS

CODE: 041

TIME: 3:00 HOURS   Wednesday 10ᵗʰ July, 2024 A.M

INSTRUCTIONS

1. This paper consists section **A** and **B** with total of **fourteen (14)** questions

2. Answer **all** questions in both sections

3. Section A carries **60 marks** and section B carries **40 marks**

4. **NECTA'S** Mathematical table and non - programmable calculators may be used

5. Celluar phones, smart watch and any other unauthorized materials are **not** allowed in the room

6. Write your **Examination Number** on every pag of your answer booklet (s)

This paper consists of 4 printed pages

1 (a) Find the percentage of numbers which are factors of 60 from the set of counting numbers up to 10.

   (b) (i) Find the difference between the smallest and the largest of the fractions $^4/_7$, $^3/_5$ and $^2/_3$

        (ii) Expression 3.125125125... as a fraction

2 (a) If $\dfrac{\sqrt{3}}{2 + \sqrt{3}} = a + b\sqrt{c}$ find the values of a, b and c

   (b) (i) Solve the equation $\left[\dfrac{9}{\sqrt{3}}\right]^{2x} = \dfrac{1}{81}$

        (ii) Given that log 2 = 0.3010 and log 3 = 0.4771. Find the value of log 2.25 without using mathematical table

3 (a) In a school of 75 students, 40% of students take Biology but not Chemistry, 32% take both subjects and 12% of them take Chemistry but not Biology.
        (i) Display this information on venn - diagram
        (ii) How many students do not take either Biology or Chemistry

   (b) A bag contain 5 red balls, 3 blue balls and 2 yellow balls. A ball is drawn and not replaced. A second ball is drawn. Find the probability of drawing
        (i) Two red balls
        (ii) Two balls of the same colour

4 (a) The coordinates of X, Y and Z are (2,m) (-3, 1) and (6,n) respectively. If the length $\overline{XY}$ is $5\sqrt{2}$ units and the midpoint of $\overline{YZ}$ is $(^3/_2, -1)$. Find the possible values of m and n.

   (b) A boat sails due North at a speed of 120km/h and a wind blows at a speed of 40km/h due East. Find the actual speed of the boat. Use $\sqrt{10} = 3.16$

5 (a) In a triangle ABC, the line $\overline{BD}$ is perpendicular to $\overline{AC}$. $\overline{AD} = (x + 6)$ cm, $\overline{DC} = (x + 2)$ cm and the height $\overline{BD} = (x + 1)$ cm, The area of triangle ABC is 40cm². Calculate he lenght of $\overline{BC}$

   (b) Given that $\triangle$ABC and $\triangle$ PQR are similar. Find the value of AĈB when AB̂C + QP̂R = 130°

6 (a) A boy has a pile of four books on his desk. The thickness of the books are 22 millimeters, 39 millimeters, 13 millimeters and 18 millimeters respectively. Can the pile fit in a shelf of a height of 10 centimetres? If so calculate the space left.

   (b) The distance of the horizon dkm varies as the square root of the height h m at the observer above the sea level. An observer at a height of 100m above sea level sees the horizon at a distance of 35.7km Find
        (i) The distance of the horizon from an observer 70m above sea level
        (ii) An equation connecting d and h

7 (a) Ali bought a goat for sh 100,000 after slaughtering it, he obtained 30kg of meat which he sold at sh 8000 per kg. How much did each of them get if Ali shared the profit with his young brother in the ratio 3:1?

(b) Given the following transactions

Sales for 2020.................................51000
Stock at start................................. 9000
Purchases.....................................34650
Stock at close 6000
Return on sales...............................1000
Return on purchases..........................150

From the transaction deduce
(i)   Cost of goods for sale
(ii) Average stock
(iii) Rate of stock turn

8 (a) Find the sum of all multiples of 7 between 15 and 140 inclusive

(b) Find the amount of 4096 shillings for 18 months at $12\frac{1}{2}\%$ per annum, the interest being compounded semi - annually

9 (a) If $\propto$ an β are complementary angles such that $\cos \propto = \frac{\sqrt{3}}{2}$ find the value of $2\sin \beta \sin \propto$

(b) A and B are two points on the ground level and both lies west of the flag staff. The angles of elevation of the top of the flag staff from A is 56° and from B is 43°. If B is 28m from the foot of the flag staff. How far apart are the points A and B?

10 (a) Solve the simultaneous equations
$x^2 + 4y^2 = 2$ and $2x + 4y - 4 = 0$

(b) A rectangular garden is 6 metres wide and 8 metres long. What length added to the shorter side and reduced from the longer side will result in a rectangular garden with an area of 45 square metres?

SECTION B (40 Marks)

11 (a) Seed pods are collected and weighed to the nearest grams as shown in the table below

Class mark (x)	11.5	15.5	19.5	23.5	27.5	31.5	35.5
Cumulative frequency	20	45	77	125	160	187	210

Calculate
(i) Median
(ii) Mean using assumed mean 23.5

(b) A chord of a circle is 12cm long. If the diameter of a circle is 20cm. Calculate the distance from the centre of a circle to the centre of the chord

12 (a) A right pyramid with a rectangular base 6cm by 8cm has a slant height of 13cm Calculate.

(i) The angle between a slant height with base

(ii) The volume of the pyramid

(b) The positions of two towns A and B are given as A $(55^{\circ}N, 95^{\circ}W)$ and B $(55^{\circ}N, 35^{\circ}E)$. Calculate

(i) The radius of the circle of latitude

(ii) The length of the chord AB

13 (a) (i) Given that $A = \begin{pmatrix} x+1 & x-1 \\ 2x & x \end{pmatrix}$ find the value of x if the matrix A is a non - singular matrix

(ii) Given that; $A = \begin{pmatrix} 2 & 4 \\ 3 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 11 & 3 \\ 4 & 1 \end{pmatrix}$ find C such that BC = A

(b) The point $(5, 2)$ undergoes the transformation $\begin{pmatrix} 1 & 2 \\ 4 & -4 \end{pmatrix}$ followed by a translation $\begin{pmatrix} 3 \\ 4 \end{pmatrix}$, determine the coordinate of the image

14. (a) Given that $f(x) = ax + b$, find "a" and "b" if $f(1) = 3$ and $f(2) = 5$, hence write the function

(b) Calculate the domain and range of the relation $y = \sqrt{16 - x^2}$

(c) A manufacturing company makes shirts and trousers, both of which require time on two manufacturing machines. A shirt requires 1 hour on machine A and 2 hours on machine B, while a trouser requires 3 hours on machine A and 1 hour on machine B. Each machine is operated for at most 15 hours per day. The profit on each shirt is Tshs 2500 and on each trouser is Tshs 4000. How many shirts and trousers should be manufactured to maximize profit?