THE UNITED REPUBLIC OF TANZANIA

PRESIDENT'S OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

(KATAVI, MBEYA, NJOMBE, RUKWA, RUVUMA AND SONGWE)

FORM FOUR ZONAL MOCK II EXAMINATION

041 BASIC MATHEMATICS

TIME: 3:00 HOURS YEAR: 2025

INSTRUCTIONS

1. This paper consists of section A and B with a total of **fourteen (14)** questions.
2. Answer **all** questions.
3. Section A carry **sixty (60)** marks and section B carry **forty (40)** marks.
4. NECTA Mathematical table and Non-programmable calculator may be used.
5. All communication devices and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer sheets provided.
7. The following constant may be used.
   - Radius of the earth, R = 6370km
   - Pie, π = 3.14

SECTION A (60 Marks)

Answer **all** questions in this section.

1. (a) Three alarms are programmed to sound at interval of 25 minutes, 30 minutes and 35 minutes. Given that three alarms sound together at a particular time, determine the time in hours, it will take for them to sound together again.

   (b) There 150 people at a cricket match. 20% are children, half are men and the rest are women. How many women are at the cricket match?

   (c) Express the given decimal into fraction: $0.27\dot{3}$

2. (a) Given that $\frac{\sqrt{2}+\sqrt{3}}{\sqrt{2}-\sqrt{3}} = a + b\sqrt{c}$ find the value of $a,\ b$ and c

   (b) Given that $\log 2 = 0.3010$, $\log 3 = 0.4771$ and $\log 5 = 0.6989$, Find the value of $\log(7.5)$

3. (a) Out of 130 students at a certain school, 10 study physics and mathematics while 28 study neither of the two subjects. Those who study physics only are three times as many as those who study mathematics only. How many students study mathematics?

   (b) The probability that kelvin goes swimming on any day is 0.2 . On a day when he goes swimming, the probability that has chips for supper is 0.75 . On a day when he does not go to swimming, the probability that he has chips for supper is x .

   (i) Represent this information in the tree diagram

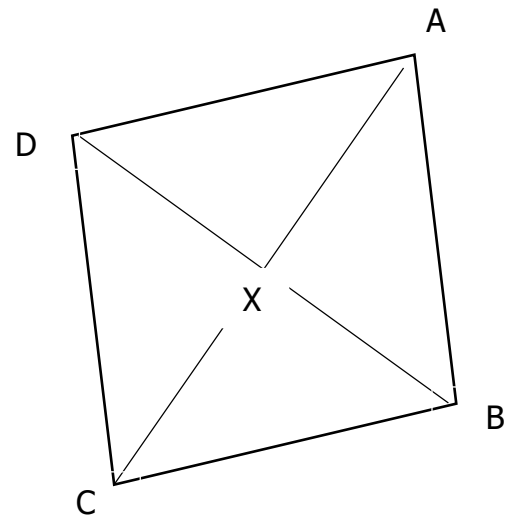
   (ii) Find the value of x, if the probability that kelvin has no chips for supper on any day is 0.45.

4. (a) The coordinate of P, Q and R are $(2,\ m),\ (-3,\ 1)$ and $(6,\ n)$ respectively. If the length of PQ is $5\sqrt{2}$ units and midpoint of QR is $(\frac{3}{2}, -1)$. Find the possible value of m and n.

   (b) Given that $\underline{a} = \underline{i} + 3\underline{j}$, $\underline{b} = 2\underline{i} - \underline{j}$ and $\underline{c} = 4\underline{i} + 5\underline{j}$ Find the value of p and q such that $\underline{c} = p\,\underline{a} - q\,\underline{b}$

5. (a) Find the area of a regular pentagon inscribed in a circle whose radius is 8 cm. (Leave your answer to 2 decimal places)

(b) Given that X is the midpoint of $\overline{\mathrm{DB}}$ and $\overline{\mathrm{AC}}$ Prove that $\Delta \mathrm{DXC} \cong \Delta \mathrm{BXA}$



6. (a) A piece of length $7.42\ \mathrm{m}$ is to be cut off from a string that is $13.5\ \mathrm{m}$ long. If the remaining part of the string is to be divided into equal pieces of length $32\ \mathrm{cm}$, how many pieces are there?

(b) Suppose that the resistance to the notion of a car is directly proportional to the square speed of the car and that the resistance is 4000 N at a speed of $72\ \mathrm{km/h}$. At what speed is the resistance 6250 N?

7. (a) Mr. Elly bought a car at Tsh. 6,300,000 from RDG Motors Ltd and sold the same car five years later to MTA Company Ltd at Tsh. 5,400,000. What is the percentage profit or loss Mr. Elly get?

(b) The following information extracted from BM Trades Company as at 30th July 2020:

Stock at start …… 42,000
Purchase's return …….. 48,000
Sales return ……... 20,000
Carriage inward …….. 42% of sales
Sales …….. 420,000

Calculate

(i) Cost of Goods sold

(ii) Gross profit

8. (a) Three numbers $x-2$, x and $x+3$ are three consecutive numbers of a geometric progression. Calculate the fourth term.

(b) If the sum of three consecutive terms of arithmetic progression is 12 and the sum of their square is 56. Determine the terms.

9. (a) If $\tan A = \frac{5}{12}$ where A is an acute angle, Find the value of:

i) $\sin A$

ii) $\frac{\cos A - \sin A}{1 - \tan A}$

(b) As observed from the top of the light house 100 m above the sea level, the angle of depression of a luxurious marine boat sailing directly toward it changes from 30° to 45°. Determine the distance travelled by the boat during the period of observations.

10. (a) (i) Solve the quadratic equation $2x^2 - 5x - 3 = 0$ by the method of completing square.

(ii) The operation on integers p and k is defined by $p * k = pk + 2p - 3k$, find the value of a if $5 * a = 20$

(b) Rahul and Rohan have a total of 45 pens together. After losing 5 pens each, the product of number of pens they both have 124. Find out the number of pens each had initially if Rahul has more number of pens than Rohan.

SECTION B (40 Marks)

Answer **all** questions in this sections

11. (a) The frequency distribution table indicate the monthly netball match at a certain secondary school.

Number of matches	50 – 100	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350
Number of students	10	14	15	9	8	5

(i) Find Mean by using assumed mean method, select the assumed mean from the class mark of the modal class.

(ii) Draw the histogram and frequency polygon curve on the same graph, hence use the graph to estimate the mode of netball matches.

(b) If the length of an arc is 8.72 cm. what is the radius of a circle that an arc subtends an angle of 20° at the center of a circle?

12. (a) The pyramid VABCD has a square base with side of 14 cm each and vertex V. the slanting edge of the pyramid is 16 cm. Find the height of the pyramid and its volume.

(b) A ship sails from point $A\,(10^{\circ}S,\ 30^{\circ}W)$ to $B(10^{\circ}N,\ 30^{\circ}W)$ at 20 knots. If it leaves a point A at 12:00 noon on Monday, when will it arrive at point B? (Approximate calculated hours to whole numbers where necessary)

13. (a) If $A = \begin{pmatrix} 4 & 0 \\ 0 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} -5 & 0 \\ 0 & -5 \end{pmatrix}$ Find the value of p and q if $A\begin{pmatrix} 3 \\ p \end{pmatrix} = B\begin{pmatrix} q \\ -1 \end{pmatrix}$

(b) Find the inverse of matrix $\begin{pmatrix} 9 & 4 \\ 2 & 1 \end{pmatrix}$, hence use the result to solve the system of equations: $\begin{matrix} 9x + 4y = 17 \\ 2x + y = 4 \end{matrix}$

(c) Find the image of the point $(2,\ 4)$ under reflection in the line $x - y = 0$ followed by another reflection in the line $x + y = 0$.

14. (a) The function f is defined by $f(x) = \begin{cases} x & if \quad -5 < x < 5 \\ x^2 & if \quad x \geq 0 \\ x + 2 & if \quad x < -2 \end{cases}$

i) Draw the graph of $f(x)$

ii) Determine the domain and range of $f(x)$

(b) A small industry makes two types of clothes namely type A and type B. Each type A clothes takes 3 hours to produce and uses 6 meters of material and each type B clothes takes 6 hours to produce and uses 7 meters of material. The workers can work for a total of 60 hours and there is 90 meters of material available. If the profit on a type A cloth is 4,000 Shillings and on a type B cloth is 6,000 shillings. Find how many of each type should be made for maximum profit?