THE UNITED REPUBLIC OF TANZANIA

PRESIDENT'S OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

MOROGORO REGION

FORM FOUR MOCK EXAMINATION, 2021

BASIC MATHEMATICS

041

Time: 3 Hours   Tuesday 13th July, 2021 am

INSTRUCTIONS

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

2. Answer **all** questions in both sections. Each question in section A carries **six (6)** marks where as in section B carries **ten (10)** marks.

3. **All** necessary working and answers for each question done must be shown clearly.

4. Mathematical tables and non-programmable calculator may be used.

5. Cellular phones and any unauthorized materials are not allowed in the examination room.

6. Write your **Examination number** on every page of your answer sheet(s) provided.

7. Whenever necessary, use;
   (i) Pie, $\pi = 3.14$
   (ii) Radius of the earth, $R = 6370 \ km$ and 1Nm = 1.852 Km

This paper consists of 4 printed pages

SECTION A (60 Marks)

Answer **all** questions in this section.

1. (a) The total mass of maize vested by students' at Mbuyuni secondary school was 19652.137 kg. Write this number correct to;

   (i) Two decimal places.

   (ii) Two significant figures.

   (iii) Nearest hundredths.

   (b) Two tankers contain 825 litres and 675 litres of kerosine oil respectively. Find the maximum capacity of container which can measure the kerosine oil of both the tankers when used an exact number of times.

2. (a) Given that $M = \frac{x-1}{\sqrt{x}+1}$, rationalize the denominator, then find M when $x = 36$.

   (b) Solve for x given that, $log(x-1) + log(x+8) = 2log(x+2)$.

3. (a) For sets A and B, n(A) = 43, n(B) = 32, $\mu = 100$ and n(A∪B) = 60. Find, n(A∩B)$'$

   (b) John uses a car or bus when he goes to the duty with probability of 0.4 and 0.6 respectively. The probability that he is late and he uses a bus is 0.8 and 0.3 when he uses a car;

   (i) Draw the tree diagram to illustrate the information.

   (ii) Find the probability that he is late.

   (iii) Find the probability that he uses bus and he is not late.

4. (a) Find the value of q if the points A(3, q), B(0,4) and C(-2, 8) are collinear.

   (b) Let $\underline{a} = 2\underline{i} - 4\underline{j}$ and $\underline{b} = 3\underline{i} + 7\underline{j}$. Find;

   (i) The resultant vector $\underline{v} = \frac{1}{2}\underline{a} + 2\underline{b}$.

   (ii) Find the unit vector in the direction of vector $\underline{v}$.

5. (a) ΔPQR is an equilateral triangle, $\overrightarrow{QP}$ is produced to S such that $\overrightarrow{PS} = \overrightarrow{QR}$. Calculate $Q\hat{R}S$.

   (b) The radii of two circles are in the ratio of 1:4. The area of the smaller circle is 12cm². Find the area of the larger circle.

6. (a) Peter bought motor vehicle spare parts from Japan worth 5,900,000 Japan Yen. When he arrived in Tanzania he was charged custom duty 25% on the spare parts. Calculate the duty he paid in Tanzanian shillings if the exchange rate were as follows;
   1US dollar = 120 Japanese Yen and 1US dollar =2300 Tanzanian Shillings.

   (b) An electric wire 10.6m long is cut into equal pieces of 0.53cm each. How many pieces will be obtained?

7. (a) Find the percentage rate at which the interest on Tsh. 160,000 for 36 months is Tsh. 9,600.

(b)   Mr. Motepa started business on 1st March 2019 with cash in hand Tsh. 77,000 as capital.

March 02: He purchased goods for cash Tsh. 32,000

04: He paid rent Tsh. 8,000

12: He drew cash for personal use Tsh. 2,000

15: Cash sales Tsh. 20,000

20: Carried in ward Tsh. 1,000

25: Paid salaries Tsh. 5,000

25: Return inward Tsh. 800

29: Return outward Tsh. 2,500

31: Stationary sh. 1,000

Prepare a balanced cash account as on 31st March 2019.

8.   (a)   Safina will work at a certain Manufacturing company with a starting annual salary of Tsh. 1,500,000. If the company offers an annual increment of Tsh. 50,000 how much will she get after nine years?

(b)   The nth term of a sequence is given as 3^{2n-1},

(i) Determine the first four terms of the sequence.

(ii) Show that the sum of the first n terms is given by $\frac{3}{8}(3^{2n} - 1)$

9.   (a)   A ladder just reaches the top of a wall 18m high when the end of the ground is 8m from the wall. What is the length of the ladder? (Express your answer correct to the nearest whole number).

(b)   If α and β are complementary angles such that $\cos \alpha = \frac{\sqrt{3}}{2}$, find the value of $2\sin \alpha \sin \beta$.

10.   (a)   Simplify the expression, $\frac{2x^2 - 8}{x^2 + x - 6}$

(b)   The perimeter of a rectangular garden is 60 metres and its area is 209 Square metres. Find the dimensions of the garden.

SECTION B (40 Marks)

Answer **all** questions from this section.

11.   (a) A masters' graduate summarized his research findings by histogram below;
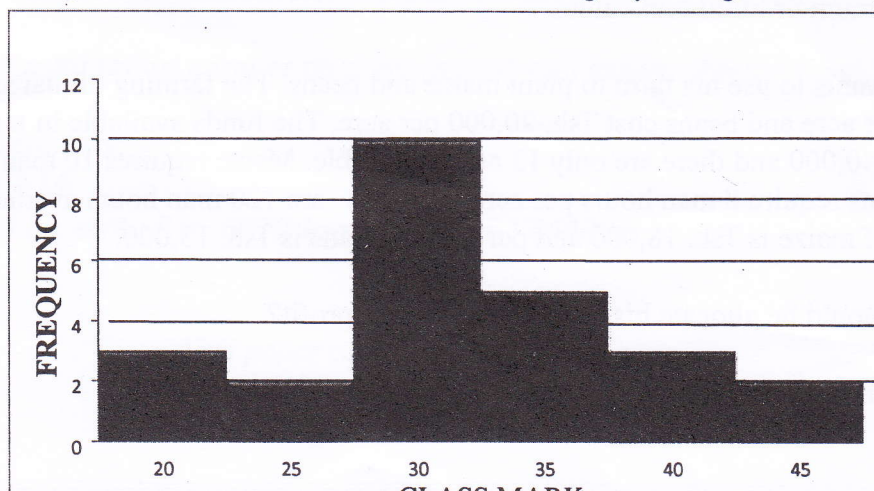
(i)   Construct the frequency distribution table showing interval, frequency and class marks.

(ii)   Calculate the mean.

(iii)   Draw a cumulative frequency curve and use it to estimate median.

(b)   Argue with reason that the angle in a semi – circle is a right angle.

12.   (a)   Find the distance measured along the parallel of latitude 56^0N, between the two points P(56^0N, 23^0E) and Q(56^0N, 17^0W). Give the answer in kilometres and in nautical miles.

(b)   The figure below represent a rectangular tank in which $\overline{AB}$ = 6 cm, $\overline{BC}$ = 2cm and $\overline{CG}$ = 4 cm;
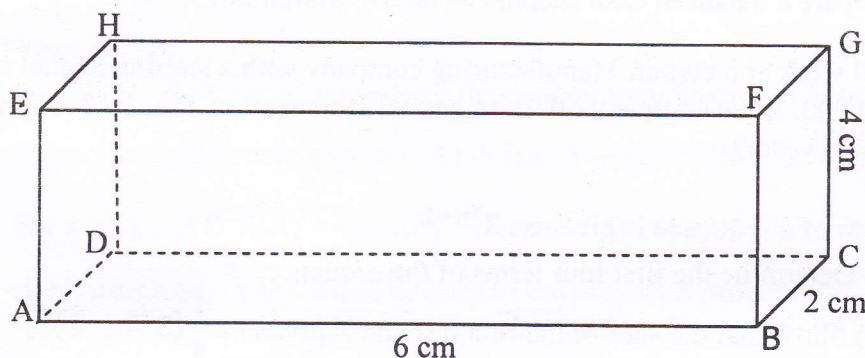
Find the angle formed by the line EC makes with the base ABCD.

13.   (a)   Given matrix A = $\begin{bmatrix} 1 & y \\ x & 5 \end{bmatrix}$ and matrix B = $\begin{bmatrix} -5 & 3 \\ 2 & -1 \end{bmatrix}$. Find the value of x and y where matrix B is an inverse of matrix A.

(b)   Solve for x and y by using the inverse method if, $x + 3y - 6 = 0$ and $3x - y = 8$.

(c)   A matrix T maps point (4, 2) onto (0, 2) and point (6, 1) onto (4, 1) Find the matrix T.

14.   (a)   Given the function $f(x) = 2x^2 - x - 6$. Find the;

(i) Axis of symmetry.

(ii) Turning point.

(iii) Maximum or minimum value.

(b)   Makoye wants to use his farm to plant maize and beans. The farming of maize cost Tsh. 12,000 per acre and beans cost Tsh. 20,000 per acre. The funds available in farming the two crops is 240,000 and there are only 13 acres available. Maize requires 10 man hours per acre while beans require 8 man hours per acre and there are 120 man hours available. If the profit per acre of maize is Tsh. 18,000 and per acre of beans is Tsh. 15,000.

(i) How should he allocate his farm for maximum profit?

(ii) What is the maximum profit?