KOLOLO SENIOR SECONDARY SCHOOL

S.5 SUB MATHEMATICS

END OF TERM ONE EXAM 2024

TIME: **2** hours **15** minutes

INSTRUCTIONS:

- Answer all the seven questions in Section **A** and any three questions from section **B**.
- All necessary working must be shown clearly.
- Silent, non-programmable scientific calculators and mathematical tables with list of formulae may be used.

SECTION A (35 MARKS)
*Attemped **All** questions*

1. Solve for x in $\log_5(4 - x) - \log_5(x + 2) = \log_5 x$ (05 marks)

2. Find the possible values of t in the equation: $8 - 10t - 3t^2 = 0$ (05 marks)

3. Find the variance of each of the following sets of numbers.

   $1769, 1771, 1772, 1775, 1778, 1781, 1784$ (05 marks)

4. If matrix $R = \begin{pmatrix} n + 4 & 3 \\ 4 & n \end{pmatrix}$ is a singular matrix, Find the possible values of n. (05 marks)

5. Solve the simultaneous equations.
   x – y = 5
   3x + 2y = 5 (05 marks)

6. Given that $\frac{3\sqrt{2} - 2\sqrt{3}}{3\sqrt{2} + 2\sqrt{3}} = P + Q\sqrt{r}$. Find the P, Q and r. (05 marks)

7. Solve the equation; $2^{2x+2} + 8 = 33(2^x)$ (05 marks)

SECTION B (45 MARKS)
*Attempt **Three** questions*

8. (a) If $\log_3 x - \log_9 x + \log_{27} x = \frac{5}{3}$ Find the value of x. (05 marks)

   (b) Solve the equation: $3^{2x} - 12(3^x) + 27 = 0$ (05 marks)

   (c) Simplify $\frac{1}{3 - \sqrt{7}} + \frac{1}{3 + \sqrt{7}}$ (05 marks)

9. The table below shows the age at which women marry in a certain country.

19	20	19	22	28	22
30	31	36	21	29	24
34	33	39	23	26	21
32	18	21	37	25	27
17	35	24	25	27	22
16	38	36	26	38	21

   a) Form a frequency distribution table with class intervals of 5 with lowest age at 16.
   b) Calculate;
      i)   Mean
      ii)   Variance
   c) Draw a cumulative frequency curve and use it to estimate the upper quartile.   (15 marks)

10. Kabaali a factory manager wishes to manufacture boxes of buscuits and water. It costs sh. 52,000 to produce a box of biscuits and sh. 64,000 to produce a box of water. He is to sell each box of biscuits at sh. 62,000 and of water sh. 72,000. He wishes to spend not more than sh. 832,000 on production. It takes two workers to produce a box of biscuits and three workers to produce a box of water. The factory can accommodate more than 24 workers. He intends to produce at least twice as many water boxes as boxes of biscuits but he also wants to produce at least two boxes of biscuits. If he produces x boxes of biscuits and y boxes of water;

   a) Write down the four inequalities from the scenario above.

   b) Draw a graph representing the above inequalities.

   c) Determine the number of boxes of biscuits and water that Kabaali can produce in order to get a maximum profit and find this profit.   (15 marks)

11. (a) Given that $A = \begin{pmatrix} 1 & 2 \\ 2 & 3 \end{pmatrix}$ show that $A^2 - 4A = I$ where I is identity matrix of 2x2.

                                                                                        (05 marks)

   (b) A vendor supplies bread, milk and newspapers weekly to 3 families A, B and C as follows, family A 2 loaves of bread, 3 litres of milk and newspaper. Family B; 2 litres of milk and a loaf of bread and family C; 2 new papers, 2 loaves of bread and a litre of milk.
   i)   Write down a 3x3 matrix that represents all items for each family supplied in the first 2 weeks.
   ii)   If the vendor supplied milk at shs 500 per litre, bread at shs 2000per loaf and each newspaper at shs 1500. Write down a 1x3 matrix.
   iii)   By multiplying the above   matrices calculate how much each family pays in 2 weeks.
                                                                                        (10 marks)

END