S475/1
SUBSIDINARY
MATHEMATICS
Paper 1
2hours 40 minutes

SET ONE

PRE REGISTRATION EXAMINATIONS 2024

Uganda Advanced Certificate of Education

SUBSIDIARY MATHEMATICS

Paper 1
2hours 40 minutes

Instructions to candidates:

- *Attempt **ALL** questions in section **A** and **FOUR** from section **B.***
- *Any additional question (s) answer will not be marked.*
- *All working **must be** shown clearly*
- *No paper should be given for rough work.*
- *Squared papers and mathematical tables are provided.*
- *Silent, non-programmable scientific calculator may be used.*

-Where necessary, use $g = 9.8ms^{-2}$

SECTION A (40 MARKS)

Answer **all** questions in this section

1. Given that $\log_5 x = 4\log_5 2 - \log_5 4 + 2\log_5 2$, find the value of x. (05 marks)

2. (a) Find the number of different ways in which the letters in the name **WAGUWENDA** can be arranged. (02 marks)

(b) How many of these arrangements are possible if the vowels are together. (03 marks)

3. The vectors $\mathbf{a} = 3\mathbf{i} + 4\mathbf{j}$ and $\mathrm{b} = 5\mathbf{i} - 12\mathbf{j}$

a) Determine $\mathbf{a} \,.\, \mathbf{b}$. (02 marks)

b) Angle between the vectors **a** and **b.** (03 marks)

4. The 12th term of an arithmetic progression is 17 and the sum of the first 31 terms is 1023. Find the 31st term. (05 marks)

5. The table below shows the cost of the items required to make a cake.

Item	Price 2020	Price 2022	Weight
Flour per kg	600	780	12
Sugar per kg	500	400	5
Milk per kg	250	300	2
Eggs per egg	100	150	1

Calculate the weighted aggregate price index for the cost of a cake using 2020 as the base year (5 marks)

6. A coin is biased so that it is twice as likely to show a head as tail. Find the probability that in six tosses of the coin.

(i) Exactly three heads are obtained (2 marks)

(ii) More than four heads are obtained (3 marks)

7. The table below shows the number of student (x) and weight (y)

Number of student (x)	74	29	55	74	55	36	61	79
Cost of printing (y)	66	81	54	58	98	73	93	85

Calculate spearman's rank correlation coefficient and comment on your answer. (05 marks)

8. Two events A and B are independent such that $\mathrm{P(A)} = {}^{1}/_{4}$ and $\mathrm{P(B)} = {}^{3}/_{5}$. Find,

(i) $\mathrm{P(AuB)}$

(ii) $\mathrm{P(AnB')}$ (05 marks)

SECTION B (60 MARKS)

Answer **only four** questions from this section and select **atleast one question** from each part.

PART 1 (PURE MATHEMATICS)

9(a). Express $16x^2-24x+10$ in the form $(4x+\boldsymbol{a})^2+\mathbf{b}$ and state the values of **a** and **b**. (03 marks)

(b). Given that $\propto$ and β are the roots of the equation $2x^2-6x-4=0$. Form an equation whose roots are $1/\propto^2$ and $1/\beta^2$. (06 marks)

(c). The polynomial $\mathbf{P(x)=x^3-3x^2+bx+c}$ has **remainder 8** when divided by $(x-2)$ and polynomial is divisible by $(x+1)$. Find value of **b** and **c**. (06 marks)

10. Determine the turning point of the curve $y=8+2x-x^2$,

(a). Sketch the curve and find the area enclosed by the curve and the $x-$axis. (10 marks)

(b). Given that $\frac{dy}{dx}=\frac{2x-1}{2y+1}$, Find the equation of the curve given that it passes through the point $(-1,1)$. (05 marks)

11. Given that $\cos A=\sqrt{5}/3$ and $sinB=1/3$

(a). Where **A** is an acute and **B** is an obtuse angle. Find

(i). $\sin A+\cos B$ (05 marks)

(ii). show that $\frac{1-\tan^2 A}{\cos A+\sin A}=\frac{3\sqrt{5}-6}{5}$. (05 marks)

(b). Solve by factorization $6\cos^2\theta-\cos\theta=1$ for $0°\leq\theta\leq360°$ (05 marks)

12. Mr. WAGUWENDA a mathematics teacher at Kyaddondo Secondary School stocks two brands of pens i.e. Nice clear and Beifer for his students. These pens are in bundles of the same size. He wants to order for original supplies and has a room for up to 1000 bundles. Beifer is more popular and he decides to order atleast twice as many bundles of Beifer as Nice clear. He wishes however to have atleast 100 bundles of Nice clear and not more than 800 bundles of Beifer.

(a). Write down four inequalities involving **x** and **y** which satisfy these conditions. (04 marks)

(b). Using a scale of 1cm: 100 units on each axis, draw a suitable graph to represent the above inequalities. (07 marks)

(c). The profit on a bundle of Nice clear is sh.300 and on a bundle of Beifer is sh. 200. Use your graph to estimate the number of bundles of each type that Mr. WAGUWENDA should order to give the maximum profit. (04 marks)

PART II (STATISTICS AND PROBABILITY)

13. The table below shows the distribution of marks of 80 students in S.6 mock examination

Marks	44 – 47	48 – 51	52 – 55	56 – 59	60 – 63	64 – 67	68 – 71	72 – 75
Cumulative frequency	2	5	14	24	44	58	64	80

(a). Calculate
(i). Mean
(ii). Mode (06 marks)
(b). Plot an Ogive for the distribution and use it to estimate
(i). Median
(ii). Pass mark if 40 students passed (09 marks)

14(a). The heights of boys at a particular age follow a normal distribution with mean 150.3cm and variance 25cm. find the probability that a boy chosen at random from his age group has a height
(i). Less than 153cm
(ii). Between 150cm and 158cm (10 marks)
(b). Given X$\simeq$ Bin $\left(48, \frac{1}{4}\right)$, Find the mean and standard deviation. (05 marks)

15. The weight of maize flour used every day in a certain primary school to organize students' meals for 4 days are shown in the following table.

Day	**Monday**		**Tuesday**		**Wednesday**		**Thursday**	
Period	**Lunch**	**Supper**	**Lunch**	**Supper**	**Lunch**	**Supper**	**Lunch**	**Supper**
Flour used in Kg	36	45	29	43	38	45	52	46

(a). Calculate the three point moving averages for the data.
(b). On the same axis, plot the original data and the moving averages.
(c). Comment on the weight of maize flour used in the period. (15 marks)

16(a). The table below shows the probability discrete function of random variable x.

x	1	2	3	4	5
P(x = x)	$1/16$	2K	$1/4$	K	$3/8$

Find the
(i). Value of K (02 marks)
(ii). Variance of X. (05 marks)
(b). The p.d.f of a continuous random variable X is given by $f(x) = \begin{cases} 3Px^2, & 1 \leq x \leq 3 \\ 0, & \text{elsewhere.} \end{cases}$

Find.
(i). The value of p. (05 marks)
(ii). $p(x > 2)$ (03 marks)

END