Students Name: .....

School Name..... Index Number .....

S475/1
SUB MATHS
Paper 1
2HRS 40 MINS

HES MOCK EXAMINATIONS 2025

UGANDA ADVANCED CERTIFICATE OF EDUCATION

SUBSIDIARY MATHEMATICS

PAPER 1

2 HOURS 40 MINUTES

INSTRUCTIONS

- This paper consists of two sections A and B section A is compulsory
- Section B consists of two parts, one and two, answer only for questions from this section, choosing at least one question from each part.
- Any additional question(s) answered will not be marked.

SECTION A

Answer all the questions in this section

1. Given that $\frac{\sqrt{8}-\sqrt{18}}{1-\sqrt{2}}$ = a + b $\sqrt{2}$, determine the values of a and b. (5 marks)
2. The first term of an A.P is 15 and the fourth term is 6. Find the 10^{th} term and the sum of the first 10 terms. (5 marks)
3. The events A and B satisfy P(A) =P(B)=X and P(AuB) = $\frac{11}{36}$. given that A and B are independent, determine the values of X. (5 marks)
4. Solve the differential equation $3x^2 + \frac{dy}{dx} - 4 = 0$ given that y=6 when X =1 (5 marks)
5. The table below shows the price (ushs) for maize and beans in the years 2024 and 2025

Commodity	**Price (Shs)**	
	2024	**2025**
bean	4000	5000
Maize	800	1500

Using 2024 as the base year, calculate the simple aggregate price index for the commodities in 2025. (5 marks)

6. Solve the equation $4\cos\theta - 3\sec\theta = 2\tan\theta$ for $-180^0 \leq 180^0$.
7. A random variable has the following distribution
P(X=1)=0.1, P(X=2)=0.4, P(X=3)=0.3 and P(X=4)=0.2. Find;
   (i) The cumulative distribution function (3 marks)
   (ii) The graph of f(x) (2 marks)
8. If a student randomly guesses at five multiple choice questions, find the probability that the student gets exactly three correct answers if each questions has five possible choices. (5 marks)

SECTION B

Answer only four questions from this section, choosing atleast one question from each p[art. All questions carry equal marks.

PART ONE: PURE MATHEMATICS

9. Sketch the curve $y = 9x^2 - 8x - 1$ and find the area enclosed between the curve and the x-axis. (15 marks)

10. The position vectors $\overrightarrow{OP} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\overrightarrow{OQ} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$ are joined to form triangle OPQ. Determine;
    (i) The length of triangle OPQ
    (ii) The angle between OP and OQ
    (iii) The area of the triangle OPQ

11. Keita deals in second hand cars of two types, Toyota Hiace TH and Nissan caravan NC. He has shs. 800m to invest in an inland car deport that accommodates 26 cars. TH cost 40m while NC costs shs 25m. The expected profit on TH is shs. 2m while on a NC costs shs. 1 million.
    a) Express the above information as a linear programming model.
    b) Using the graphical method, determine the number of cars that Keita should stock in order to maximize profits.

12. a) Given that $A=\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$ and I is a 2x2 identify matrix, obtain the values of x and y such that $A^2 = XA + YI$. (5 marks)

    b) Using Cramer's rule, solve the simultaneous equations

    $3x - y = 6$ $\qquad\qquad$ $x = 3 - 2y$ (5 marks)

    c) Find the value of P for which the equation $4(x-1)(x-2) = P$ has roots which differ by 2.

PART TWO: STATISTICS

13. The table below shows mark obtained by students of physics in a certain school.

Marks	30-	40-	50-	60-	70-	80-< 90
Cumulative Frequency	2	31	68	84	98	100

a) Draw a cumulative frequency curve for the given data.
Use the O'give to estimate the media mark and the upper quartile.
(10 marks)

b) Calculate the standard deviation (5 marks)

14. The table below shows the number of first grades scored by candidates class of a certain school on termly basis for years 2010 to 2013

Year	**First Grades**		
	1st term	2nd term	3rd term
2010	72	80	84
2011	76	92	80
2012	96	100	98
2013	102	108	x

a) Calculate a three point moving averages for the data

b) On the same graph, plot the first grades and the 3 point moving averages.

c) (i) comment on the trend of performance
(ii) Predict the number of first grade x obtained in 3rd term of 2013.
(15 marks)

15. The table below shows the percentage of sand in the soil at different depths (in cm)

Soil depth	60	51	90	20	75	45	25	55	65	35
Percentage of sand	77	86	58	96	68	79	92	84	70	86

a) (i) Plot a scatter diagram for the data. Comment on the relationship between the depth of the soil and the percentage of sand in the soil.

(ii) draw a line of beat fit through the points of the scatter diagram. Use it to estimate the

- Percentage of sand in the soil at the depth 31cm.
- Depth of soil with 54% sand.

b) Calculate the rank correlation co-efficient between the percentage of sand in the soil and the depth of soil.

16. A random variable X has the probability density function.

$$f(x) = \begin{cases} a\,x, & 0 < x < 1 \\ \left(\frac{a}{2}\right)^{x}, & 1 \leq x \leq 2 \\ o; elsewhere \end{cases}$$

Find (i) The value of a

(ii) The mean

(iii) Standard deviation of x

END