

S475/1
SUBSID. MATHEMATICS
Paper 1
May. 2022
2 $\frac{2}{3}$ hours

EXTERNAL MOCK EXAMINATIONS 2022 (SET 1)

Uganda Advanced Certificate of Education

SUBSIDIARY MATHEMATICS

Paper 1

2 hours 40 minutes

INSTRUCTIONS TO CANDIDATES:

*Answer **all** the **eight** questions in section **A** and any **four** questions from section **B**.*

*Any additional question(s) answered will **not** be marked.*

*Each question in section **A** carries **5** marks while each question in section **B** carries **15** marks.*

*All necessary working **must** be clearly shown.*

Begin each answer on a fresh sheet of paper.

Silent, non – programmable scientific calculators and mathematical tables with a list of formulae may be used.

Assume where necessary, acceleration due to gravity $g = 9.8\text{ms}^{-2}$.

Graph paper is provided.

Neat work is a must!!

Turn Over

SECTION A: (40 MARKS)Answer **all** the questions in this section

1. Solve the equation: $\log_{25} 4x^2 = \log_5(3 - x^2)$. (05marks)
2. The table below shows the marks scored by S.5 students in a subsidiary mathematics test.

Class	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 – 44
Frequency	2	6	3	4	k	2	1

If the modal mark is 31.64 marks, determine the value of k to the nearest integral value (05 marks)

3. The fifth term of an Arithmetic progression (AP) is 12 and the sum of the first 5 terms is 80. Determine the first term and the common difference (05marks)

4. The table below shows the unit prices in shillings of three commodities in 2017 and 2018 together with their values.

Commodity	Price in 2017	Price in 2018	Value
Rice	3200	4000	3
Maize flour	1200	2200	2
Beans	2000	2500	1

Using 2017 as the base, calculate the value index. (05marks)

5. Solve the differential equation $x^2 \frac{dy}{dx} = \frac{1}{y}$; given that $y = 2$ when $x = 1$. (05marks)

6. Events A and B are such that $P(A'/B) = 3/7$. Find:

(a) $P(A \cap B)$ (03marks)

(b) $P(A/B)$ (02marks)

7. Given that $\begin{pmatrix} a & c \\ b & d \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5x - 3y \\ 7x + 2y \end{pmatrix}$. Find the values of a , b , c and d . (05marks)

8. A car moves along a straight road from point P to point Q with uniform acceleration $\frac{4}{5} ms^{-2}$ in 25 seconds. The car reaches point Q with a velocity of $25ms^{-1}$. Find the distance travelled by the car from point P to Q . (05marks)

SECTION B (60MARKS)*Answer four questions in this section*

9. The table below shows the relationship between the marks scored by 8 candidates marked by two examiners X and Y .

X	72	60	56	76	68	52	80	64
Y	56	44	60	74	66	38	68	52

- (a) (i) Draw a scatter diagram for the above data.
- (ii) By drawing the line of best fit, estimate the marks awarded by examiner X when examiner Y awards 48. (09marks)
- (b) Calculate the Spearman's rank correlation coefficient between marks awarded by examiner X and Y . Comment on your result. (06marks)

10. (a) On the same axes, sketch the curves $y = x(x + 2)$ and $y = x(4 - x)$. (12marks)
- (b) Find the area enclosed by the two curves. (03marks)

11. The weekly sales of text books recorded by Wakata stationery shop for 1st term (February to April) were as shown.

	WEEK			
MONTH	1	2	3	4
February	30	100	35	105
March	40	110	45	115
April	50	120	55	125

- (a) Use the data to calculate a four weekly moving averages. (07marks)
- (b) On the same axes, plot the four point moving averages and the original data. (05marks)
- (c) Use your graph in (b) above to find the number of books that were sold in the first week of May. (03marks)
12. (a) Solve the equation $2\cos^2 \theta - \sin \theta = 1$, for θ in the range $0^\circ \leq \theta \leq 360^\circ$ (09marks)
- (b) Prove that: $\frac{\sin x}{1 - \cos x} + \frac{\sin x}{1 + \cos x} = 2\operatorname{cosec} x$. (06marks)

13. The probability density function of a continuous random variable X is given by

$$f(x) = \begin{cases} \frac{2}{13}(x + 1); & 0 \leq x \leq a \\ \frac{2}{13}(5 - x); & a \leq x \leq b \\ 0, & \text{otherwise} \end{cases}$$

Determine the:

- (a) values of a and b . (10marks)
- (b) $P(X < 2.5)$ (05marks)

14. A box of mass 5kg rests on a rough inclined plane of inclination 60° to the horizontal.

The coefficient of friction between the box and the plane is $\frac{7}{20}$. Determine the least force acting;

- (a) parallel to the plane that will move the box up the plane. (08marks)
- (b) horizontally that will prevent the box from slipping down the plane. (07marks)

END