

S475/1  
SUB MATHS  
Paper 1  
2<sup>2</sup>/<sub>3</sub> Hours  
July, 2023

**INTERNAL MOCK EXAMINATIONS 2023**

**Uganda advanced Certificate of Education**

**SUBSIDIARY MATHEMATICS**

**Paper 1**

2 Hours 40 Minutes

**INSTRUCTIONS TO CANDIDATES:**

- Attempt **all** the questions in section A and any **five (5)** questions from section B.
- Any additional question(s) answered shall **not** be marked.
- **All** the necessary working **should** be clearly shown.
- Begin each answer in section B on a **fresh** sheet of paper.
- Silent, non – programmable scientific calculators and mathematical tables with a list of formulae may be used.
- Attach this question paper on your answer sheets.

SECTION A								SECTION B						TOTAL
1	2	3	4	5	6	7	8	9	10	11	12	13	14	

### SECTION A (40 MARKS)

Answer **all** questions in this section.

1. Solve the equation  $3 \cos \theta + 2 \sin \theta = 0$  for  $0^\circ \leq \theta \leq 360^\circ$ . (05 marks)
2. When the polynomial  $x^3 + ax^2 - 3x + 4$  is divided by  $x - 2$ , the remainder is 14. Find the value of  $a$ . (04 marks)
3. Solve the equation  $2^x + 2^{1-x} = 3$ . (05 marks)
4. Find  $\int x(2x + 3)(3x - 2) dx$  (05 marks)
6. Find the three consecutive terms of an AP whose sum is 18 and product is 120. (06 marks)
7. Two events are such that  $P(A) = \frac{3}{4}$ ,  $P(B) = \frac{4}{7}$  and  $P(A \cap B') = \frac{2}{5}$ , find
  - (i)  $P(A \cap B)$  (03 marks)
  - (ii)  $P(A/B)$  (02 marks)
8. The table below shows the marks obtained by a group of students from a certain school in a Sub-Maths tests in term I and in term II.

Term I	53	74	48	71	74	60	66	60
Term II	41	50	44	38	41	44	48	45

Calculate the rank correlation coefficient and comment on your result. (05 marks)

### SECTION B (60 MARKS)

Answer **only four (04)** questions in this section. All questions carry equal marks.

9. The weights of Buffalos in Queen Elizabeth national park over a period of seven years were as shown in the frequency distribution table.

Weight (kg)	Frequency (f)
400 – 449	4
450 – 499	7
500 – 549	6
550 – 599	13
600 – 649	9
650 – 699	1

- (a) Estimate the mean and standard deviation of the weights of the Buffalos. (07 marks)
- (b) Draw a cumulative frequency curve and use it to estimate the semi –interquartile range. (08 marks)

10. The cost of making toasted bread is calculated from the cost of banking flour, sugar, milk, eggs and food colour.

Item	2017	2018	Weight
Wheat flour per kg	5100	5700	10
Sugar per kg	4000	3600	5
Milk per litre	1000	1400	4
Eggs per tray	9000	8500	2
food colour per packet	1000	1300	1

Using 2017 as the base year

- (a) Calculate the;
- price relatives for each item. **(05 marks)**
  - simple aggregate price index. **(03 marks)**
  - weighted aggregate price index and comment on your result. **(04 marks)**
- (b) If the cost of making a toasted bread in 2018 was Shs.2200, estimate the cost in 2017 of making toasted bread. **(03 marks)**
11. (a) Find the angle between the vectors  $-3\mathbf{i} + 2\mathbf{j}$  and  $2\mathbf{i} + \mathbf{j}$ . **(05 marks)**
- (b) The position vectors of three collinear  $P, Q$  and  $R$  are  $\mathbf{a} - 2\mathbf{b}$ ,  $2\mathbf{a} - 3\mathbf{b}$  and  $\mu\mathbf{a} - 6\mathbf{b}$  respectively where  $\mu$  is a constant. Find the:
- value of  $\mu$ .
  - ratio  $PQ:QR$  **(10 marks)**
12. A discrete random variable has a probability distribution given by
- $$P(X = x) = \begin{cases} kx; & x = 1, 2, 3, 4, 5 \\ k(10 - x); & x = 6, 7, 8, 9 \\ 0; & \text{Elsewhere} \end{cases}$$
- Find:
- the value of the constant  $k$ . **(07 marks)**
  - $E(X)$ . **(05 marks)**
  - $Var(X)$ . **(03 marks)**
13. (a) Given that the determinant of  $\begin{pmatrix} x & 1 \\ 3x & 2x \end{pmatrix}$  is 10, find the value of  $x$ . **(06 marks)**
- (b) A house girl buys the following items in three weeks. Week one she buys 2 packets of tea, 2 tins of margarine, 2 kg of sugar and 3 packets of biscuits. Week two she buys 2 tins of margarine, 3 kg of sugar and 4 packets of biscuits. Week three she buys 1 packet of tea, 2 kg of sugar and 2 packets of biscuits.
- Write this information in a  $3 \times 4$  matrix. **(01 mark)**

- (ii) A packet of tea costs shs.1000, a tin of margarine costs shs.6500, a kilogramme of sugar costs shs.2800 and a packet of biscuits costs shs.500. Write a column matrix for the cost of the items. **(01 marks)**
- (iii) Find her expenditure in the three weeks. **(07 marks)**
14. King Export Company is to transport 300 tonnes of pineapples. Two Cargo planes are available. A Boeing which can carry 30 tonnes of pineapples per flight and an Airbus which can carry 20 tonnes of pineapples per flight. The Airbus has to make more flights than the Boeing. The Boeing has to make at least 3 flights. The company has 150,000 US dollars for transport costs. The cost per flight is 12,000 dollars for Boeing and 9,000 dollars for Airbus. If  $x$  is the number of flights made by the Boeing and  $y$  the number of flights made by the Airbus,
- (a) Write down four inequalities satisfying the given conditions. **(04 marks)**
- (b) Plot graphs of the inequalities you have formed on the same axes and shade the unwanted regions. **(06 marks)**
- (c) Find the number of flights each plane should make if the cost of transport is to be minimum. **(05 marks)**

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