

PAWOR SEED SECONDARY SCHOOL
END OF TERM ONE EXAMINATION 2025
SENIOR FIVE
SUBSIDIARY MATHEMATICS
1 hour

INSTRUCTIONS :

1. Answer **all** examination items question.
2. **All** answers **must** be written in the Answer Sheet(s) provided.
3. **All** necessary working **must** be shown clearly
4. Begin each answer on afresh sheet of paper
5. Silent,non-programmable scientific calculators and mathematical tables with alist of formulae may be used.

Item One

Mr.Olunga is the chairperson of *Elite Savings and Development Association*, a local community initiative that supports youth and women through small business grants and training workshops. In the first half of the year, the association supported two groups: **Youth Enterprises** and **Women Cooperatives** in three major sectors: *Agriculture*, *Retail*, and *Crafts*.

He recorded the number of support packages given as matrix S :

$$S = \begin{bmatrix} 10 & 15 & 12 \\ 8 & 20 & 14 \end{bmatrix}$$

In another matrix C , he tracked the *average capital* (in million UGX) allocated per package in each sector:

$$C = \begin{bmatrix} 1.2 & 0.8 & 0.6 \\ 1.5 & 1.0 & 0.9 \end{bmatrix}$$

Note:

Rows: Youth Enterprises (row 1), Women Cooperatives (row 2)

Columns: Agriculture, Retail, Crafts

Tasks

- (a) Interpret the element $P_{2,3}$ and $Q_{1,2}$ in the context of this scenario.
- (b) Find the transpose of matrix Q , denoted Q^T , and state the order of Q^T .
- (c) Compute the matrix product $P \times Q^T$, and explain what the result represents in this context.
- (d) Suppose the school wants to compute an **efficiency score per class** by assigning a weight matrix

$$W = [0.3 \quad 0.4 \quad 0.3]$$

(using weights for the importance of each activity). Compute the **weighted average performance** of each class using matrix multiplication.

- (e) Assume matrix

$$M = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$$

represents a transformation of resource allocation between Senior Five and Senior Six.

- (i) Find the determinant of matrix M .
- (ii) Determine whether M is invertible.
- (iii) If invertible, find M^{-1} .

Item Two

At a community-based school event, two students were tasked with purchasing snacks for their respective groups. The school canteen sells **packets of biscuits** and **bottles of juice** at fixed but unknown prices.

- The first student buys **3 packets of biscuits and 2 bottles of juice** for **UGX 8,400**.
- The second student buys **2 packets of biscuits and 4 bottles of juice** for **UGX 9,200**.

Let the price of one packet of biscuits be **UGX** x , and the price of one bottle of juice be **UGX** y .

Tasks:

- (a) Form a pair of simultaneous equations in x and y to represent this situation.
- (b) Solve the equations simultaneously to determine the cost of one packet of biscuits and one bottle of juice.
- (c) Due to inflation, the price of each packet of biscuits increases by 15%, and the price of each bottle of juice increases by 10%. Calculate the total cost for a student who buys **5 packets of biscuits and 6 bottles of juice** after the price change.

End