



**SET TWO**

**KAMSSA PRE REGISTRATION EXAMINATIONS 2026**

**Uganda Advanced Certificate of Education**

**PURE MATHEMATICS**

**Paper 1**

**Time: 3 Hours**

**INSTRUCTIONS TO STUDENTS:**

- *This paper consists of three sections; A, B and C. It has eight(8) examinations items.*
- *Section A has two items. Answer one item only.*
- *Section B has two items. Answer only one item from this section*
- *Section C has two parts; part I and part II. Answer one item from each part.*
- *Answer a total of four(4) items.*
- *Any additional item(s) answered will not be scored.*
- *All answers must be written in the answer booklets/sheets provided.*
- *Graph paper is provided.*
- *Silent non-programmable scientific calculators and mathematical tables with a list of formulae may be used.*

**SECTION A**

**ITEM 1**

After demarcation of land, a surveyor decides to represent the land on paper work as a requirement for preparing its title by the ministry of lands. The surveyor locates a point P with co-ordinates (2, 1) and a straight-line L perpendicular to OP and passes through P where O is the origin. The line L meets the  $x$ -axis at A and  $y$ -axis at B. The estate company needs to sell the plots OAP and OBP. Each square unit of land in the area costs Ugsh. 1,000,000. The company director needs to know the amount of money from each plot.

**Task:**

You have been approached by the Director, address his challenge.

**ITEM 2**

In data transmission, the cyclic Redundancy check rely on a polynomial  $f(x) = 2x^3 + 3x^2 - 32x + 15$  to check the data integrity. The data is corrupted if  $f(x)=0$  when inputs are fed into the computer which are not known by the operator. In control room of broad casting stations, a receiver pricks up a mixed signal defined by  $x + y = 6$ ,

$x^2y^2 + 2xy - 35 = 0$ . Give that  $x$  is a signal from station A and  $y$  is a signal from B.

**Task**

**Help;**

- The operator to identify the inputs for checking the corruption of data.
- To decode the individual signals.

## SECTION B

*Answer any one item from this section*

### ITEM 3

A site engineer states that the roof of the building should be in triangular form ABC. According to his report, the following are stated;

The ties and struts are strong if

$$\frac{\sin(A-B)}{\sin(A+B)} = \frac{a^2-b^2}{c^2}.$$

- ✓ The angle of inclination of ties to struts must be  $\theta$ , defined by  $7 \cos 2\theta + 6 \sin 2\theta = 5$  where  $0^\circ \leq \theta \leq 180^\circ$
- ✓ Length of sides  $a$  and  $b$  of the roof must make  $x^4 + 6x^3 + 13x^2 + ax + b$  a perfect square.

**Task**

The Engineer is unable to turn up to the site due to sickness and one of the workers has approached you; Determine;

- If the ties and struts are strong
- Angle of inclination of ties to struts
- Length of sides  $a$  and  $b$  of the roof.

### ITEM 4

According to the plan, the Ssezibwa bridge construction frame work is such that the angle between struts and ties must be  $\theta$  and the inclination of the horizontal slab to the vertical wall must be  $\alpha$ .

**Hint**

- ✓  $7 \cos 2\theta + 6 \sin 2\theta = 5$  for  $0^\circ \leq \theta \leq 180^\circ$
- ✓  $2 \cos 2\alpha - 5 \cos \alpha = 4$  for  $0^\circ \leq \alpha \leq 360^\circ$ .

The engineer is sick and unable to turn up on site. It happens that you are one of the workers.

**Task**

As a learner of mathematics;

Advise your fellow workers on how to incline

- The struts and line
- Horizontal slab to the vertical wall.

## SECTION C

*Part I*

*Answer only one item from this part*

### ITEM 5

An estate company dealing in selling and buying plots ( $x$ ) of land make profits  $P$  defined by the function  $P(x) = x^2 + 12x + 32$ . A triangular plot ABC on market is such that sides  $a = 7\text{cm}$ ,  $b = 4\text{cm}$  and  $c = 5\text{cm}$ . According to the manager, he states that the previous year, the

company made minimum profits and he is interested in knowing the number of plots sold that year. However, the technician states that, for the plot ABC to be demarcated on the land title, the software demands values of  $\cos A$  and  $\sin A$ .

**Task**

As a mathematician;

- a) Address the challenges of the manager
- b) Help the technician to demarcate the plot ABC on the land title using the software.

**ITEM 6**

Every school day, your siblings drink tea before leaving home at 7:30 A.M. so that they can report to school on time.

Your mother usually wakes up at 6:00A.M. and takes 30 minutes to prepare the tea. The moment the tea is ready and poured into the cup, its temperature is  $90^{\circ}\text{C}$ . The surrounding (room) temperature is constant at  $25^{\circ}\text{C}$  and it begins to cool naturally.

Ten minutes later, its temperature has drops to  $70^{\circ}\text{C}$ . Assume that surrounding temperature remains constant, no reheating, no stirring, no isolation or other heat loss processes occur except cooling to the room air.

Your siblings find it comfortable to start drinking the tea only when its temperature is  $30^{\circ}\text{C}$ , and they take exactly 15 minutes to finish drinking before leaving home.

However, they sometimes fail to take the tea or arrive late due to delayed breakfast, your siblings wish to advise their mother on the correct time she should wake up so that the tea is ready on time, it cools naturally and they finish drinking exactly at 7:30 A.M.

**Task:**

- a) Advise the mother on the optimal waking time to meet all requirements.
- b) Compare your recommended time with the mothers' current 6:00am routine.

**PART II**

*Answer only one item from this part*

**ITEM 7**

A resident of U.S.A buys land on a grid reference  $(x, y, z)$  online in Uganda defined by  $2x = 3y = 4z$  and  $x^2 - 9y^2 - 4z + 8 = 0$ . When he sends the reference to his wife in Uganda, the wife fails to locate the land. Also the wife finds difficult in accessing money sent to her in a bank since has to get the pin code as  $\underline{a}$  sent in a test question,  $26 \left(1 - \frac{1}{26^2}\right)^{1/2} = a\sqrt{3}$ .

The wife has approached you;

**Task**

Help to

- a) Locate the land
- b) Find the pin code.

**ITEM 8**

a) A rectangular field of area  $7200\text{m}^2$  is to be fenced using a wire mesh. On one side of the field is a straight river. This side of the field is not to be fenced. Find the dimensions of the field that will minimise the amount of wire mesh to be used.

b) If  $x^2 + 3y^2 = k$ , where  $k$  is a constant, find  $\frac{dy}{dx}$  at the point  $(1, 2)$ .

**END**