S475/1
SUBSID. MATHEMATICS
PAPER 1
$2^2/_3$ hours

WAKISSHA

Uganda Advanced Certificate of Education

SUBSIDIARY MATHEMATICS

PAPER 1

2hours 40minutes

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.*
- **All** *working* **must** *be shown clearly.*
- *Each question in section* **A** *carries* **5** *marks while each question in section* **B** *carries* **15** *marks.*
- *Begin each answer on a fresh page.*
- *Graph papers are provided.*
- *Silent non-programmable scientific calculators and mathematical tables with a list of formulae may be used.*
- *Where necessary take* $g = 9.8ms^{-2}$.

Turn Over

SECTION A (40 marks)

Answer **all** questions in this section.

1. The marks scored in a test by 8 student are 3, 4, -1, 22, 14, 0, 9, 18.
   Determine the:-
   i) Mean mark. (02 marks)
   ii) Variance . (03 marks)

2. Evaluate $\int_{-1}^{2} \frac{2x^4 - 6x^5}{2x^2}\, dx$. (05 marks)

3. A random variable x has a probability distribution given by

$$P(x = x) = \begin{cases} \frac{x}{5k}, x = 1,2,3,4 \\ 0 \quad Elsewhere \end{cases}$$

   Calculate the:-
   (a) value of K (02 marks)
   (b) mean of x, E(x). (03 marks)

4. A card is picked at random from a pack of 30 cards numbered 1, 2, 3,…..30. Given that the card shows an even number. Find the probability that it is a multiple of 5. (05 marks)

5. Solve the equation $2\text{Sin}\theta\ \text{Cos}\theta = \tan\theta$, for values of $0^0 < \theta < 180^0$ (05 marks)

6. Express $\frac{2}{\sqrt{5}+\sqrt{3}} + \frac{2}{\sqrt{5}-\sqrt{3}}$ in the form $a\sqrt{b}$, where a and b are integers.
   (05marks)

7. Use matrix method to solve the simultaneous equations
   $3x^2 + 5y = 2$
   $2x^2 - 3y = 14$ (05 marks)

8. A hummer of mass 4.5kg falls through a vertical height of 1m and hits a nail of mass 50 grams directly without rebounding. If the nail is then driven into a piece of wood to a depth of 2cm, find the common velocity of the hammer and nail just after impact. (05 marks)

SECTION B (60 marks)

Answer any **four** questions from this section.

9. The equation of a curve is $y = 4x - x^2$.
   a) (i) Determine the turning point of the curve.
      (ii) Find the nature of the turning point.
      (iii) Sketch the graph of the curve.
      (07 marks)
   b) The curve and the line y = 3 intersect at the point (1, 3) and (3, 3). Calculate the area of the region enclosed between the line and the curve.
      (08 marks)

10. Points A, B and C have position vectors $4i-j$, $i+3j$ and $-5i+2j$ respectively in the $x-y$ plane.

a) Find the value of 3OA + 4OB – 2OC (04 marks)

b) Determine

(i) AB and AC (04 marks)

(ii) AB.AC (02 marks)

(iii) angle ABC (05 marks)

11. A random variable X has the probability density function f(x) where;

$$f(x)=\begin{cases}k(1-x^2);0\le x\le 1\\0 \qquad otherwise\end{cases}$$

Find;

i) The value of the constant K. (04 marks)

ii) The mean and variance (11 marks)

12. The table below shows the sales of soda in crates at a certain canteen open for five days in a week.

Week	Mon	Tue	Wed	Thur	Fri
1	142	177	213	171	138
2	125	172	191	170	131
3	114	158	192	155	127

a) Calculate the five point moving averages for the sales of sodas in creates. (06 marks)

b) On the same axes plot the original data and the moving averages (07 marks)

c) Comment on the trend of the sales of soda. (02 marks)

13. The time taken by a milk man to deliver to the main market in Kampala is normally distributed with mean of 12 minutes and standard deviation of 2 minutes.

a) Find the probability that the time he takes on any day is

(i) longer than 17 minutes. (04 marks)

(ii) lying between 9 and 13 minutes (05 marks)

b) Estimate the number of days during the year when he takes less than 10 minutes to deliver. (06 marks)

14. a) A body of mass 4kg decreases it kinetic energy by 42 J. If its initial speed was 5m/s. Find its final speed. (06 marks)

b) A B C D is a rectangle. Forces of 9N, 8N, and 3N act along the lines DC, CB and BA respectively in the direction indicated by the order of the letters. Find;

(i) the magnitude of the resultant force. (05 marks)

(ii) angle it makes with DC (04 marks)

END