S475/1
SUBSID. MATHEMATICS
Paper 1
[redacted]
$2^2/_3$ hrs.

Uganda Advanced Certificate of Education

[redacted]

SUBSIDIARY MATHEMATICS

Paper 1

2 hours 40 minutes

INSTRUCTIONS TO CANDIDATES:

Answer **all** *the* **eight** *questions in section* **A** *and only* **four** *questions in 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 *working* **must** *be shown clearly.*

Begin each answer on a fresh sheet of paper.

Graph paper is provided.

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

Where necessary, take $g = 9.8\,ms^{-2}$.

Turn Over

SECTION A: (40 marks)

Answer **all** *the questions in this section.*

1. Prove that $x-2$ is a factor to the polynomial $P(x)=6x^3-5x^2-17x+6$ and hence solve the equation $6x^3-5x^2-17x+6=0$.
(*05 marks*)

2. Two points A and B have position vectors $2i+5j$ and $3i-j$ respectively, find angle AOB where O is the origin.
(*05 marks*)

3. How many possible committees each of five members can be formed from 6 boys and 5 girls if there must be at least a boy and a girl on each committee? (*05 marks*)

4. The probabilities for three soldiers A, B and C to hit a target are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{3}{5}$ respectively. If each solder hits only once, determine the probability that the target is hit by only one solder.
(*05 marks*)

5. The table below shows the price relatives for the commodities A, B, C, D and E with their corresponding weights.

Commodity	A	B	C	D	E
Price relative	145	125	130	x	120
Weight	2	3	4	5	1

It was noted that the cost of living had increased by 27%.

Find the;

(a) cost of living index.
(*02 marks*)

(b) value of x.
(*03 marks*)

6. Show that $\tan\theta+\cot\theta=\sec\theta\,\mathrm{cosec}\,\theta$. (*05 marks*)

7. Evaluate; $\int_{1}^{4}\left(\frac{x^2+x-1}{\sqrt{x}}\right)dx$ (*05 marks*)

8. A bullet of mass 30 grammes is fired horizontally at a close range through a fixed block with an initial velocity of $80\,ms^{-1}$. After penetrating $100\,cm$ in the block, its velocity is $20\,ms^{-1}$.

Find the;

(a) resistance offered by the wood against the bullet's penetration, (*03 marks*)

(b) time taken by the bullet to come to rest. (*02 marks*)

SECTION B: (60 marks)

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

9. The table below represents the length of 40 leaves in millimetres.

Length (mm)	18.0 – 18.9	19.0 – 19.9	20.0 – 20.9	21.0 – 21.9	22.0 – 22.9	23.0 – 23.9
Number of leaves	3	12	7	11	4	3

(a) Calculate the;

(i) mean length,

(ii) standard deviation. (*06 marks*)

(b) Draw a cumulative frequency curve (ogive) and use it to estimate the;

(i) median length,

(ii) 80th percentile length,

(iii) semi – interquartile range. (*09 marks*)

10. The mass, M of a radioactive sample decays at a rate which is inversely proportional to the remaining mass, M. A sample of mass $52g$ decayed to $48g$ in 6 minutes.

(a) Form a differential equation and solve it.

(*07 marks*)

(b) Determine the mass of this sample in the next 4 minutes.

(*04 marks*)

(c) Find the time taken by the sample to decay to half of its original value.

(*04 marks*)

11. The table below represents daily attendance of S.6 students in one of the schools in Wakiso.

DAY OF THE WEEK	**ATTENDANCE**			
	Week 1	**Week 2**	**Week 3**	**Week 4**
Monday	20	30	38	38
Tuesday	25	34	38	40
Wednesday	31	40	40	40
Thursday	32	38	40	40
Friday	26	36	37	40

Turn Over

(a) Using a suitable table, calculate the five day moving totals and moving averages. (*06 marks*)

(b) On the same axes, plot the daily attendance and moving averages.(*05 marks*)

(c) Using your graph in (b) above,

(i) comment on the general trend of students attendance,

(*01 mark*)

(ii) estimate the number of students who attended on Monday of the fifth week.
(*03 marks*)

12. (a) The prices of three baskets are in geometric progression (G.P). The total price for the three baskets is shs 8,400 and the most expensive basket priced at shs 4,800. Determine the prices of the other two baskets. (*07 marks*)

(b) Opio deposits shs 600,000 in a bank every 1st January beginning with 1st January 2006; the bank gives compound interest rate of 18% per annum. If no withdraws are made, find his total amount and interest recieved by the end of 31st December 2010. (*08 marks*)

13. The weights of children in a village are normally distributed with mean of $8kg$ and variance $0.81kg^2$.

(a) Find the probability of picking a child whose weight is

(i) over $9kg$,

(ii) at most $6kg$,

(iii) between 6 and $9kg$. (*10 marks*)

(b) If the village has $24{,}370$ children, estimate the number of children who weigh at least $5.4kg$.
(*05 marks*)

14. A mass of $2kg$ rests on a rough horizontal table and is connected by a light in extensible string passing over a smooth fixed pulley at the edge of the table to another $3kg$ mass hanging freely. The coefficient of friction between the $2kg$ mass and the table is ½ and the system was released from rest.

(a) Find the tension in the string and the common acceleration of the system.
(*07 marks*)

(b) If the string snaps when the system has been in motion for only 3 seconds, find the;
(i) extra distance covered by the $2kg$ mass before it comes to rest.

(ii) how long it takes the $2kg$ mass to come to rest.

(*08 marks*)

END