S475/1
SUBSID.MATHEMATICS
Paper 1
July/August, 2019
$2\frac{2}{3}$ Hours

WESTERN JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education

SUBSIDIARY MATHEMATICS

Paper 1

2 Hours 40Minutes

INSTRUCTIONS TO CANDIDATES;

- Answer all the eight questions in section A and only four questions in section B.
- Any additional questions 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.
- Where necessary take acceleration due to gravity $g=9.8ms^2$
- Silent non programmable scientific calculators and mathematics tables with a list of formulae may be used.

SECTION A:(40 MARKS)

Answer all the questions in this section

1. Evaluate $\frac{2\log \quad + \log 8 - \log 375}{\frac{1}{3}\log \quad - \log \quad \frac{1}{3}}$ (05 marks)

2. The 3rd,5th, and 8th terms of an A.P are 3n+8, n+24 and n^3+15 respectively.

   Find the value of n and hence the common difference of the A.P. (05 marks)

3. The table below shows the marks scored by ten students in mathematics and physics tests.

Student	A	B	C	D	E	F	G	H	I	J
Mathematics	40	48	79	26	55	35	37	70	60	41
Physics	59	62	68	47	46	39	63	29	55	67

   Calculate the rank correlation coefficient between the performance of mathematics and physics.Comment on your result(05 marks)

4. Solve the equation,

   $2cos^2\theta + 3cos\theta + 1 = 0 \qquad for\ 0^0 \leq \theta \leq 360^0$(05 marks)

5. A discrete random variable x has a probability distribution given by

   $P(x = x) = \begin{cases} kx : x = 1,2,\ldots\ldots,5 \\ 0 \qquad elsewhere. \end{cases}$

   (i) Determine the value of k

   (ii) Find the mean (05 marks)

6. Solve the equation using matrix method.

   $5x + 6y = 11$
   $7x + 8y = 15$(05 marks)

7. The mass A and B of 3kg and 2kg respectively are connected by alight inextensible string passing over a smooth fixed light pulley. If the system is released from rest find
   (i) Acceleration
   (ii) Tension in the string
   (05 marks)

8. The probability that Jane wins a tennis game is 0.8. She played 6 games. Find the
   (i) Mean and standard deviation of the games won.
   (ii)Probability that she won at least five games.(05 marks)

SECTION B(60 marks)

Answer only four questions from this section

9. The frequency distribution table below shows the heights of 80 students to the nearest cm.

Heights (cm)	Number of student
150-154	3
155-159	7
160-164	10
165-169	15
170-174	25
175-179	12
180-184	6
185-189	2

(a) Calculate the mean and standard deviation.(09 marks)
(b) Plot an Ogive and use it to estimate the median mark(06 marks)

10. A hot body at a temperature of 100^0C is placed in a room of temperature 20^0C. Ten minutes later, it's temperature is 60^0C.
    (a) Form a differential equation for the rate of change of temperature θ of the body with time, t(03 marks)
    (b) Solve the differential equation formed in (a) above. (10 marks)
    (c) Determine the temperature of the body after a further 10 minutes ie; When t=20minutes. (02 marks)

11. A continuous random variable x has a probability density function given by

$$F(x) = \begin{cases} \frac{k}{2} & 0 \le x \le 2 \\ \frac{k}{2}(3-x) & 2 \le x \le 3 \\ 0 & otherwise \end{cases}$$

    (a) Sketch the graph of f(x)(04 marks)
    (b) Hence or otherwise determine the value of k.(04 marks)
    (c) Find (i) mean(04 marks)
        (ii) P($0.5 < x < 1.5$)(03 marks)

12. A train took 250 seconds to move from A to B, a distance of 4km. The velocity at A was $18kmh^{-1}$. It decelerated to rest at C in 200 seconds. Assuming A,B and C lie on a straight track road. Find
    (a) Velocity of the train at B.
    (b) Acceleration of the train between A and B.
    (c) (i) Distance between B and C
        (ii) Deceleration between B and C. (15 marks)

13. (a) When f(x) = $x^3 - ax + b$ is divided by $x + 1$, the remainder is 2 and $x + 2$ is a factor of f(x). Find a and b (07 marks)
    (b)Show that $x = -2$ is a root of the equation $2x^3 - x^2 - 8x + 4 = 0$. Hence find the real roots. (08 marks)

14. Given the curve $y = x^2 + 2x - 8$
    (a) Find the intercept(03 marks)
    (b) Find the turning point and distinguish it.(04 marks)
    (c) Sketch the curve.(04 marks)
    (d) Find the area enclosed between the curve $y = x^2 + 2x - 8$ and x-axis(04 marks)

END

