MOCK SET ONE EXAMINATIONS 2019

Uganda Advanced Certificate of Education

SUBSIDIARY MATHEMATICS

S475/1

2 Hours 30 Minutes

Instructions to Candidate:

- ✓ Answer all the eight questions in section **A** and only four questions in section B.
- ✓ Any additional questions(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 clearly shown
- ✓ 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 =9.8ms^{-2}

1. An A.P has first term 10 and common difference 0.25. Find the least number of terms the A.P can have given that the sum of the terms does not exceed 300. (5marks)

2. A continuous random variable x has p.d.f given by.

$f(x) = \begin{cases} K(1+x); 0 \leq x \leq 1 \\ 0; \quad otherwise \end{cases}$

Find;

(i) The value of K (2marks)

(ii) Mean of x (3marks)

3. The table below shows scores by 8 students from A to H in physics and mathematics tests.

Student	A	B	C	D	E	F	G	H
Mathematics (x)	28	20	40	28	21	31	36	29
Physics (y)	30	20	40	28	21	31	36	29

Calculate the rank correlation coefficient for the data and comment on your result. (5marks)

4. Three boys and five girls are to be seated on a bench so that the youngest boy and the youngest girl sit next to each other. In how many ways can this be done?

5. Given that A and B are mutually exclusive events and P(A) = $\frac{2}{3}$ and P(B) = ½

Find;

i) P(AUB) (2marks)

ii) P(AnB^{1}) (3marks)

6. Points A, B and C have position vectors 2j, 4i and 2i – 2j respectively in the x – y plane.
   a) Find 20A + 30B (2marks)
   b) Determine angle between OB and OC (3marks)
7. Given that $y = 50 + 36x - 15x^2 + 2x^3$. Find the gradient of y at the origin. (5marks)

8. With its engines working at a constant rate of 369Kw, a train of mass 100 tonnes ascends, a hill of 1 in 50 at a constant speed of 54Kmhr. Find the magnitude of the resistance to motion experienced by the train.

SECTION B (60MARKS)

Answer only four questions from this section

9. The marks scored by students at Brilliant High School in a submaths test are recorded as follow.

51	64	42	52	54	83	77	62
42	54	57	63	68	53	69	52
62	49	65	75	63	82	56	69
78	58	61	80	52	77	71	55
84	72	70	70	54	66	69	67

   a) Constant a grouped frequency table with equal class width of 7 and use it to determine the median and modal classes.
   b) Calculate the
   i) Mean (2marks)
   ii) Standard deviation (2marks)

10. Joseph sold food stuff to a certain school on weekly basis for 4 weeks.
    Week 1, he sold 20kg of sugar, 30kg of maize flour and 10kg of rice
    Week 2, he sold 25kg of maize flour and 5kg of rice
    Week 3, he sold 30kg of sugar, 20kg of maize flour and 18kg of rice.
    Week 4, he sold 15kg of maize and 10kg of rice if a Kg of sugar costs Shs.4000 of maize flour Shs. 3000 and of rice Shs 3500.
    a) (i) Write a 4 x 3 matrix for the food stuff quantity
    (iii) write a 3 x 1 matrix for the cost
    b) By matrix multiplication, determine the value of the sales in each week.
    c) Find the total earning of Joseph in a month. (15marks)

11. a) Bodies of mass 6Kg and 2Kg are connected by a light inextensible string passing over a smooth fixed pulley with the masses hanging vertically. Find the acceleration of the system when released from rest. (5marks)

    b) A body of mass 2Kg moves along a smooth horizontal surface with speed 2ms-1. It then meets a rough horizontal surface whose coefficient of friction is 0.2. Find the horizontal distance it travels on the rough surface before it comes to rest. (5marks)

c) A particle of mass 5Kg rests on a smooth surface of a plane inclined at an angle of 30^{o} to the horizontal. When a force x acting up the plane is applied to the particle, it rests in equilibrium. Find the normal reaction and force x. (5marks)

12. The table below shows quarterly returns (in ten thousands of shillings) of a certain company over three years.

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
2013	14	17	27	11
2014	19	21	30	16
2015	23	24	35	20

a) Using a suitable scale, plot the graph showing the data above.
b) Calculate the four quarterly moving a verages and plot these results on the same graph in (a)
c) Draw a trend line and use it to estimate the expected returns in the first quarter of 2016. (15marks)

13. a) Find $\int \frac{x^4+1}{x^2}\, dx$ (5marks)

b) Find the gradient of the curve $y = x^2 + 7x - 2$ at the point (2,16) (5marks)

c) Differentiate $\left(3x + \sqrt{x}\right)^2$ with respect to x (5marks)

14. a) A random variable x has a probability distribution given by

$$p(x = x) = \begin{cases} \frac{x}{10}, & x = 1,2,3 \\ 0, & else\ where \end{cases}$$

Calculate

i) Mean of x
ii) Variance of x
iii) $P(1 < x \leq 3$

c) The probability that Bob wins a tennis game is $\frac{2}{3}$. He plays 8 games, what is the probability that he wins.

i) Atleast 7 games
ii) Exactly 5 games (15marks)

END