UGANDA ADVANCED CERTIFICATE OF EDUCATION
SUBSIDIARY MATHEMATICS
PAPER 1
2HOURS:40MINS

INSTRUCTIONS TO CANDIDATES

- Answer all the *eight* questions in section **A** and *four* from section **B** with *at least one* question from each part.

- All necessary working *must* be shown clearly

- Any additional question(s) answered will not be marked.

- Graph paper is provided

- Silent non-programmable scientific calculators and mathematical tables with a list of formulae may be used

SECTION A 40 MARKS

Attempt all questions.

1. Without using a calculator, evaluate $\dfrac{64^{\frac{2}{3}}+4^{-\frac{3}{2}}}{\left(\left(16^{-\frac{3}{4}}\right)\right)^2}$ (5marks)

2. The speeds to the nearest kilometre per hour of 80 vehicles passing a check point were recorded and grouped as shown in the table below.

Speed km/hr	45 - 50	51 - 55	56 - 60	61 -65	66 - 70
Number of vehicles	20	28	16	13	3

Estimate to the nearest km the;

(i)   Modal speed.
(ii)   Mean of the distribution.

(5marks)

3. Three numbers are in an arithmetic progression such that their sum and product are 9 and 24 respectively.
   Determine the;
   (i)   First Term.
   (ii)   Common difference. (5marks).

4. The table below shows the current and base year prices together with weights for items **A, B,-- F**

Item	Weight	Base year Price(shs)	Current year Price(shs)
A	25	3500	4650
B	10	800	1200
C	35	600	900
D	20	2500	3000
E	1	7500	10500
F	9	3000	3150

Calculate the weighted average price related index number and comment on your results.

(5marks)

5. Use crammers rule to solve the simultaneous equations of
$$3x - y = 4$$
$$5x + 9y = -30.$$

(5marks).

6. The probabilities of events A and B are such that $p(A) = \frac{5}{8}$ $p(AnB) = \frac{1}{6}$ use a Venn diagram to determine
   (a) P(B)
   (b) P(A/B) (5marks).

7. Solve the equation $5\cos x + 6\sin^2 x = 7$ for $270° < x < 360°$ (5marks).

8. A discrete random variable X has probability distribution as shown in the table below.

X	1	2	3	4	5
P(X=K)	0.1	0.3	a	0.2	0.15

Determine the;
(i)   Value of a.
(ii) $P(\times < 3 / X \geq 2)$ (5marks).

SECTION B (60 MARKS)

Attempt four questions with at least one question from each part.

PART ONE

9. The age in years of husbands and wives at the time of their marriage were recorded for ten
    married couples as shown in the table below.

Age of wife X	21	29	29	28	27	18	20	22	29	27
Age of husband Y	28	38	33	35	30	23	27	28	30	28

   (a) Draw a Scatter diagram and a line of best fit to illustrate the data. Comment on
       your results.   (7marks)
   (b) If a certain wife's age was 30 years, determine the expected age of the husband.
                                                                            (2marks)
   (c) Calculate a rank correction coefficient and comment on your results. (6marks)

10. The following table shows the prices (shs 000") of a certain commodity for three consecutive
    years.

Year	Quarters			
	1st	2nd	3rd	4th
2005	85	63	70	92
2006	82	61	64	84
2007	71	56	62	78

   (a) Calculate a four quarterly moving average.   (6marks)
   (b) On the same axes plot the original data and the 4-quarterly moving averages.
       Comment on your results.   (5marks)
   (c) Draw a trend line through the points and use it to predict the price of the
       commodity in the 1st quarter of 2008.   (4marks)

11. The marks scored by students who sat for end of term examination were recorded as shown.

                46 41 56 61 44 30 44 37 63 49 37
                31 49 75 70 26 83 38 48 31 59 49
                38 52 61 46 23 52 61 76 29 58 60

(a) Form a frequency table of equal class intervals 20 – 30, 30 – 40 ----------- (3marks)

(b) Draw a cumulative frequency curve and use it to determine the ;
- (i) Interquartile range.
- (ii) 70th percentile.
- (iii) Minimum pass mark if 20% of the students failed the examination (12marks).

12. Weights of bags of cement manufactured by a certain factory are normally distributed with a mean of 50kg and a standard deviation of 2kg, 2% of the bags are rejected for being underweight and 1% of the bags are rejected for being overweight.

a) Determine the range of values the weight of a bag should lie if it has to be accepted.

(10marks).

b) Calculate the probability that a bag picked at random from a large consignment will weigh less than 47.5kg (5marks)

13. The table shows the processing time of products 1 and 2 on two machines A and B manufactured by a certain company together with the selling price per unit and the maximum possible sales (units)

	Product 1	Product 2
Processing time for A (hours per unit)	4	4
Processing time for B(hours per unit)	2	4
Selling price(shillings per unit)	2000	2500
Maximum possible sales(unit)	260	300

Given that the amount of time available on the machine A is 720 hours, machine B is 520 hours and X units and Y units of products of 1 and 2 produced are all sold,

- i. Write down linear inequalities which when solved would indicate the number of product 1 and 2 if sold will maximize the total revenue of the company (4marks)
- ii. Illustrate the inequalities in a(1) above on the graph indicating constraints on both machines (6marks)
- iii. By shading the unwanted regions determine the maximum revenue for the company (5marks)

PART TWO

14. A particle moves along a straight line such that its displacement Sm from a fixed point, t seconds later is given by $s = 3t^3 - 27t^2 + 72t - 50$

a) Determine the times when
- i. it's velocity vanishes
- ii. acceleration is zero (10 marks)

b) Find the displacement for which the particle is at rest. (5marks)

15. a) Given that $\frac{dy}{dx} = kx - 3$ is a differential equation of the curve where k is a constant
- i. Express y as a function of x (2marks)
- ii. If $x = 1$ $when$ $y = -6$ and $\frac{d^2y}{dx^2} = 4$ determine the value of k and hence the equation of the curve (5marks)

b) Use the results in a(ii) above to ,

    i.   Sketch the curve

    ii.   Calculate the area enclosed between by the curve and the $x - axis$ (8 marks)

16. If $a = 3i + 2j$, $b = -3i + 3j$ and $c = 12i - 5j$

   a) Determine the value of

       i. $|a + b - c|$

       ii. x and y $such$ $that$ $xa + yb = c$ (9marks)

   b) Use dot product to calculate the between the vectors a and c (6marks)

END.