S475/1
SUBSIDIARY
MATHEMATICS
Paper 1
July/Aug. 2016
2 2/3 hours

KALUSSA JOINT MOCK EXAMINATIONS
Uganda Advanced Certificate of Education

SUBSIDIARY MATHEMATICS

Paper 1

2hours 40minutes

INSTRUCTIONS TO CANDIDATES:

Answer **all** *the eight questions in section* ***A*** *and only* **four** *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.

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

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

SECTION A: (40 MARKS)

Attempt **all** *questions in this section.*

1. Three matrices P, Q and I are such that P = $\begin{pmatrix} a & a+1 \\ a-1 & a+2 \end{pmatrix}$ is singular and I is an identity matrix. Find the value of a and hence the matrix **Q** if P + I = Q.
(05marks)

2. Given that A(1,2) B(4,3) and C(5, -1) are vertices of a triangle ABC, find angle ABC.
(05marks)

3. If $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ are the roots of the equation $4x^2 - 8x + 1 = 0$, find the equation whose roots are $\alpha \; and \; \beta$.
(05marks)

4. Two bags contain similar balls. Bag **A** contains 4 red and 3 white balls while bag **B** contains 3 red and 4 white balls. A bag is selected at random and a ball is drawn from it. Find the probability that a red ball is drawn.
(05marks)

5. When a polynomial $g(x)$ is divided by $x^2 + 2x - 3$, the remainder is $2x - 2$. find the remainder when $g(x)$ is divided by;
$x - 1$
(03marks)
$x + 3$ (02marks)

6. The table below shows the price per kg of three food crops.

Item	Price per kg (shs)		Weights
	2000	**2010**	
Beans	4000	5000	3
Millet	3000	4000	3
Maize	2500	3000	4

i) Calculate the price index of each item for 2010 basing on 2000. (03marks)
ii) Calculate the weighted price index for 2010. (02marks)

7. The number of computers sold by **JA** Company in a period of 8months is as shown below.

No. of computers	250	200	220	270	220	260	300	240
Month	Jan	Feb	Mar	April	May	Jun	Jul	Aug

Calculate the four point moving averages for the data. (05marks)

8. Three forces of magnitudes 5N, 12N and 10N on bearings of 060^0, 210^0 and 330^0 respectively act on a particle. Find the resultant of the system of forces. (05marks)

SECTION B: (60 MARKS)

Attempt only **four** *questions in this section.*

9. The table below shows the cumulative frequency distribution of marks of 800 candidates who sat a national mathematics contest.

Mark(%)	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
F	30	80	180	330	480	610	700	760	790	800

a) Calculate the mean and standard deviation (08marks)
b) Construct an Ogive for the data and use it to estimate the;
i) Median mark (04marks)
ii) Quartile deviation (02marks)
c) Proportion of candidates that failed if the pass mark was 50% (01mark)

10. A quadratic curve has gradient function *(k - 2x)* and is such that when $x = 1$, $y = 2$ $andwehnx = -1$, y = 0.

Candidates	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Math (M)	35	56	65	78	49	82	20	90	77	35
Physics (P)	57	75	62	75	53	100	38	82	82	20

Find the value of **k** and state the equation of the curve.
(07marks)
Sketch the curve.
(05marks)
Find the area bounded by the curve and the x-axis. (03marks)

11. The table below gives marks obtained in mathematics examination (**M)** and physics Examination (**P)** obtained by 10 candidates.
(i) Draw a scatter diagram and comment. (07 marks)
(ii) Find the score in mathematics by a candidate who scored 82 in physics.
(02marks)

iii) Calculate the rank correlation coefficient and comment on your result. (06marks)

12. a) A and B are events such that P(A) = $^1/_3$, P(A or B but not both) = $^5/_{12}$ and P (B) = $^1/_4$. Calculate:

P (A ∪ B)
(04marks)
P (A' ∩ B)
(02marks)
P (B'/A)
(02marks)

(a) Two men fire at a target. The probability that Allan hits the target is ½ and the probability that Bob does not hit the target is $^1/_3$. Allan fires at the target first followed by Bob. Find the probability that:

Both hit the target (02marks)
Only one hits the target (03marks)
None of them hits the target. (02marks)

13. a) Given that 2sin(A-B) = sin (A + B)
Show that tan A = 3tan B. (03marks)
Hence determine the possible values of A between -180^0 and 180^0 when $B=30^0$. (03marks)

(b) Solve the equation $sin2x - cos2x = 1$ for $0^0 \leq x \leq 360^0$. (06marks)

(c) Without using tables or calculators, show that $\cos 75^0 = \frac{\sqrt{2}(\sqrt{3}-1).}{4}$ (03marks)

14. 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. (05marks)

(b) A body of mass 2kg moves along a smooth horizontal surface with speed of $2ms^{-1}$. It then meets a rough horizontal surface whose co-efficient of friction is 0.2. Find the horizontal distance it travels on the rough surface before it comes to rest. (05marks)

(b) A particle of mass 5kg rests on a smooth surface of a plane inclined at angle 30^0 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.
(05marks)