S475/1
SUBSID. MATHEMATICS
PAPER 1
July/August 2017
$2^2/_3$ hours

# WAKISSHA 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 any* **four** *questions from section* **B**.

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

- **All** *working* **must** *be shown clearly.*

- *Each question in section* **A** *carries* **5** *marks while each question in section* **B** *carries* **15** *marks.*

- *Begin each answer on a fresh page.*

- *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$^{-2}$.*

**Turn Over**

## SECTION A (40 MARKS)

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

1. The roots of the equation $x^2 - 4x + 7 = 0$ are $\alpha$ and $\beta$. Form an equation whose roots are $\dfrac{-2}{\alpha}$ & $\dfrac{-2}{\beta}$.

   (5 marks)

2. The $10^{th}$ term of an arithmetic progression is greater than the $5^{th}$ term by 5. If the sum of the first fourteen terms is 147. Find the common difference and the first term of the series.

   (5 marks)

3. The probability that Jane answers a quiz correctly is 0.8. If she is given 12 similar quizzes to answer, find the probability that she answers;
   (i) more than 10 quizzes correctly,
   (3 marks)
   (ii) at most 2 quizzes correctly.
   (2 marks)

4. The sales (in kg) of a firm were recorded as follows; 38, 66, P, 28, 47, 56, 60, 48 and 56. If the corresponding four point moving averages were 44.0, 46.3, 43.8, 44.8, 51.8, 55.5 and Q, calculate the values of P and Q. (5 marks)

5. The gradient function of a curve at the point (-2, 10) is given by $9x^2 - 8x - 4$. Find the equation of the curve.
   (5 marks)

6. When the polynomial $p(x) = mx^4 + nx^3 - x^2 + 2x + 3$ is divided by $x^2 - x - 2$, the remainder is $3x + 5$. Find the values of m and n. (5 marks)

7. Two independent events A and B are such that $P(A) = 0.5$ and $P(B) = 0.25$. Find
   (i) $P(A \cup B)$,
   (3 marks)
   (ii) $P(\bar{A} \cap \bar{B})$.
   (2 marks)

8. Points A, B and C lie along a straight line such that AB = 100m and BC = 140m. A train moving with constant acceleration takes 20 seconds and 40 seconds to cover the successive distances. Find the;
   (i) acceleration of the train,
   (3 marks)
   (ii) speed of the train at A.
   (2 marks)

## SECTION B (60 MARKS)

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

9. The table below shows the relationship between the variables x and y.

| Variable x | 10 | 60 | 80 | 30 | 20 | 45 | 50 | 55 | 40 |
|---|---|---|---|---|---|---|---|---|---|
| Variable y | 95 | 42 | 30 | 75 | 90 | 70 | 60 | 50 | 60 |

(a) Draw a scatter diagram and use it to comment on the relationship between x and y. (6 marks)

(b) By drawing a line of best fit, estimate x when y = 67. (2 marks)

(c) Calculate the rank correlation coefficient between the variables and comment on the relationship. (7 marks)

10. A continuous random variable x has a probability density function f(x) given by

$$f(x) = \begin{cases} cx & : 0 < x < 1, \\ c(4 - x) & : 1 < x\, 3, \\ 0 & : Otherwise. \end{cases}$$

Calculate the:- (4 marks)

(a) value of c, (4 marks)

(b) mean of x, (7 marks)

(c) standard deviation of x.

11. (a) Given that $M = \begin{pmatrix} 1 & 3 \\ 2 & 0 \end{pmatrix}$ and $N = \begin{pmatrix} -3 & 1 \\ 3 & -2 \end{pmatrix}$, find MN. (3 marks)

(b) Tom and Jane went for shopping. Tom bought 2kg of posho, 1.5kg of sugar and 3kg of meat while Jane bought 1kg of posho, 0.5kg of tea leaves and 4kg of meat. The cost per kg of sugar was 4,500/=, meat was 10,000/=, posho was 3,000/= and tea leaves 1,500/=.

(i) Write down the matrices for the items bought and for the prices of the items. (2 marks)

(ii) Using the matrices, determine the difference in expenditure of Tom and Jane. (10 marks)

**Turn Over**

12. The table below shows the cost of items used in baking bread and the corresponding weights in 2010 and 2017.

| Year | 2010 | | 2017 | |
|------|-----------|--------|-----------|--------|
| Items | Price(Shs) | Weight | Price(Shs) | Weight |
| Wheat | 3,000 | 2 | 5,000 | 4 |
| Sugar | 2,500 | 3 | 4,500 | 2 |
| Milk | 1,600 | 5 | 2,000 | 3 |
| Eggs | 400 | 8 | 500 | 6 |

Taking 2010 as the base year,

(a) Calculate the simple aggregate price index for the items in 2017.

(8 marks)

(b) Find the weighted aggregate price index for the items used for baking bread.

(4 marks)

(c) If the price of a loaf of bread is 2,000/= in 2017, find the price of a loaf of bread in 2010 to the nearest shillings.

(3 marks)

13. (a) Sketch the curve $y = 5 + 4x - x^2$.

(10 marks)

(b) Calculate the area bounded by the curve and the x-axis.

(5 marks)

14. A block of mass 5kg in contact with a smooth horizontal table is connected by a light inelastic string passing over a light smooth pulley fixed at the edge of the table. The other end of the string carries another block of mass 8kg hanging freely under gravity. If the 8kg mass is 60cm above ground level and the system is released from rest calculate the:

(i) acceleration of the system,

(8 marks)

(ii) tension in the string,

(2 marks)

(iii) speed with which the 8kg mass hits the ground.

(3 marks)

(vi) time of motion for the 8kg mass.

(2 marks)

**END**