S475/1

SUB MATHEMATICS

Paper 1

July/August,2023

2hours 40minutes

TESO SECONDARY SCHOOLS MOCK EXAMINATION ASSOCIATION (TESSMEA)

Uganda Advanced Certificate of Education

SUB MATHEMATICS

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2hours 40 minutes

INSTRUCTIONS

For section A, attempt all the questions and for section B, attempt four (4), including at least one question from part 1 and part 2.

Turn Over

SECTION A: (40MARKS)

Answer all questions in this section

1. Solve the equation: $\log(7x+2) - \log(x-1) = 1$ (5marks)

2. A bag contains 18 balls, 12 Red and 6 blue. A ball is drawn at random from the bag, it's colour noted and replaced. A second ball is drawn from the bag. What is the probability that the two balls are:
   (i) Both blue (2marks)
   (ii) Different colours. (3marks)

3. Opio deposited shs. 100, 000 in the savings bank on his son's first birthday, shs 120,000 on his second, shs 140,000 on his third birthday.
   How much will be saved up when the boy reaches his 20^{th} birthday, the latter inclusive? Neglect the Bank interest. (5marks)

4. In a certain school Nine students did a submaths test and scored the following marks; 32, 30, 28, 35, 33, 37, 33, 34, 32. Find the;
   (i) Median score (2marks)
   (ii) Semi- interquartile range. (3marks)

5. Given that $\frac{ds}{dt} = 4t - 5t^2$ and that S = 0 when t = 1, find S in terms of t. (5marks)

6. The number of patients admitted in Ngora health centre IV in a period of 5 years is shown in the table below

Year	2018	2019	2020	2021	2022
Number of patients	14500	18200	17000	15500	21300

Calculate the;

(a) Three-year moving averages (3marks)
(b) Number of patients to be admitted in 2023, given that the fourth moving average is 20300. (2marks)

7. Relative to the original O, the position vectors of the points A, B and C are a = $2\mathbf{i} + 4\mathbf{j} - 5k$, b = $-2\mathbf{i} + 2\mathbf{j} - 3k$ and c = $-4i + j - 2k$ respectively. Show that A, B and C are collinear. (5marks)

8. A discrete random variable X has a probability distribution

X	1	2	2	4	5
P (X = x)	0.1	0.3	K	0.2	0.1

Find;
(i) The value of K (2marks)
(ii) Expectation, E (x) (3marks)

SECTION B: (60MARKS)

Attempt four (4) questions, including at least one question from part 1 and part 2.

PART 1

9. Given the curve $y = x(x^2 - 12)$,
   (a) Determine;
      (i) The co-ordinates and nature of the turning points
      (ii) Sketch the curve
   (b) Find the area enclosed between the curve and the X-axis. (15marks)

10. A particle moves in a straight line so that t seconds after passing a fixed point in the line, it's velocity V ms^{-1} is given by

$$V = {}^{1}/_{2}t^2 - 3t + 7$$

Calculate:
   (a) The velocity after t = 8s (2marks)
   (b) The acceleration when t = 0 (3marks)
   (c) The minimum velocity (4marks)
   (d) The distance travelled in the third second of motion. (6marks)

11. (a) The expression $6x^2 + x + 7$ leaves the same reminder when divided by $x - a$ and by $x + 2a$, when $x \neq 0$ calculate the value of a (5marks)

   (b) If $\propto$ and β are the roots of the quadratic equation $x^2 - 4x + 2 = 0$, find the;

   (i) Find the of value of $\frac{2\beta}{1+\frac{\beta}{\propto}}$ (3marks)

   and $\frac{1}{\propto\beta} - \frac{1}{\beta} - \frac{1}{\propto}$ (3marks)

   (ii) Determine the Quadratic equation whose roots are $\propto^3$ and β^3 (4marks)

12. For an in service course in physics, at least four but not more than nine teachers are to be chosen. The ratio of the number of male teachers to the number of female teachers must be less than 2:1 and there must be more males than females.
   (a) Write down in their simplest form the inequalities which must be satisfied (5marks)
   (b) Represent the information above on the graph paper and find the composition of the in service group of;
      (i) The largest size
      (ii) Smallest size (10marks)

PART 11

13. English applicants for a certain job obtained the following marks in aptitude and written tests

Applicant	A	B	C	D	E	F	G	H
Aptitude test (X)	33	45	15	42	45	35	40	48
Written test (Y)	57	60	40	75	58	48	54	68

(a) (i) Draw a scatter diagram for the data
(ii) On your scatter diagram, draw a line of best fit.
(iii) Use the line of best fit to estimate the mark scored in aptitude test when the mark scored in written was 65. (9marks)

(b) Calculate the spear man's rank correlation coefficient and comment on your result. (6marks)

14. A random variable X has the probability density function;

$$f(x) = \begin{cases} Kx\,; 1 < x < 1 \\ \left(\frac{k}{2}\right)x\,; 1 \leq x \leq 2 \\ o \quad else\ where \end{cases}$$

(a) Find;
(i) Value of K
(ii) Expectation of x
(iii) Median of x

(b) Find $P\left(\frac{1}{2} \leq X \leq {}^{3}/_{2}\right)$ (15marks)

15. The table below shows the price relatives together with their weights for a certain family in Soroti city.

Item	Weight	Price relatives
Food	172	120
Water	160	124
Housing	170	125
Electricity	210	135
Clothing	140	104

Find the;

(i) Simple price index
(ii) Cost of living (6marks)

(b) the table below shows the prices (shs) and amounts of items bought for making a cake in 2020 and 2021.

Item	Price (shs)		Amount
	2000	2021	
Flour per kg	7000	8.800	3
Sugar per kg	5000	4000	1
Milk per litre	1500	2000	2
Per Egg	400	500	8

(i) Calculate the weighted aggregate price index taking 2020 as the base year.

(ii) In 2021, the cost of making a cake was shs 90.000, using the weighted aggregate price index above, find the cost of the cake in 2020.

(9marks)

16.(a) Joan played 12 chess games, the probability that she wins a game is $^3/_4$.

Find the probability that she will win;

(i) Exactly 8 games (02marks)

(ii) More than 10 games (4marks)

(iii) Calculate the expected number of wins (1mark)

(b) A certain type of cabbage has a mass which is normally distributed with mean 1kg and standard deviation 0.15kg. In a lorry load of 800 of these cabbages, estimate how many will have mass;

(i) greater than 0.79kg (4marks)

(ii) Between 0.85kg and 1.15kg (4marks)

END