Mathematics
Paper 1
11th March, 2024
2 hours

DEPARTMENTAL QUESTION PAPER

SET TWO

S.4 MATHEMATICS

Paper One

2 hours

STUDENT'S NAME: _____

STREAM : _____

Signature: _____

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Do not write in the boxes on this page. The examiner will use them to keep a record of your marks.

Qn	1	2	3	4	5	6	7	8	9	10	11	12	13	14	**TOTAL**
Marks scored															

INSTRUCTIONS

1. Answer all the items in both sections.
2. Each item in section A carries 4 scores and each question in section B carries 15 scores.
3. Pay attention to the number of scores available for each item.
4. Show all the working and explanation on the answer sheets provided.

SECTION A: (40 SCORES)

1. The average mark of 20 candidates in a history test was 63. The 5 weakest candidates had an average of 36. Find the average mark of the other 15 candidates. *(04 scores)*

2. A two digit number is formed using the numerals 2, 3 and 4 without repeating any numeral.

(a) Write down the possibility space

(b) Find the probability that the two digit number is divisible by 2. *(04 scores)*

3. Solve the simultaneous equations using matrix method: $\frac{p}{q+1} = \frac{1}{4}, \frac{p-3}{p+q} = \frac{2}{3}$. *(04 scores)*

4. Solve the equation $log_{10}(x^2 - 6) = 1 + log_{10}(x - 3)$ *(04 scores)*

5. Maido bought a printing machine at shs 7,000,000. The depreciation rate of the machine is 14.0% per annum. Calculate the value of the machine after 2 years. *(04 scores)*

6. The class monitor of Senior Four North forgot the password of the class laptop, a four-digit number. But luckily, he remembered some hints on how to recall this password. These are:

- The first digit is half of the second.
- The sum of the second and third digits is 10.
- The forth digit is one more than the second.
- The sum of the digits is 23.

What is the password. *(04 scores)*

7. At ABC company, employees earn a net salary given by the following relation.

Net salary =Gross Pay-Income, where Income Tax=15% of the Gross Pay.

(a) Copy and complete the table.

Employee	**Gross Pay (UGX)**	**Net Salary (UGX)**
Bisaso	1,800,000	
Imelda	1,650,000	
Joshua	1,250,000	
Eve	980,000	

(b) List down the elements of the domain and range for the above relation.

(c) Is the relation above a non-function mapping or not? *(04 scores)*

8. A line passing through the point $\boldsymbol{M}\ (\mathbf{5},\mathbf{4})$ is parallel to a line passing through the points $\boldsymbol{T}(\mathbf{4},\mathbf{6})$ and $\boldsymbol{R}(\mathbf{2},\mathbf{2})$. Find the;

(a) Equation of the line through $\boldsymbol{M}$ and parallel to line $\boldsymbol{TR}$.

(b) Co-ordinates of the point of intersection of the line in (a) and the line $\boldsymbol{y = -x + 6}$. *(04 scores)*

9. Amega and Okurut have shares in a company. Amega contributed ug. Shs 400,000,000 as his share capital. Okurut contributed ug shs 600,000,000 as his share capital. In one year the company made a gross profit of ug shs 200,000,000. The company expenses that year were electricity 12,000,000, salaries and wages 55,000,000 and transport 13,000,000. The net profit was shared in proportion to their share capitals.Calculate how much money each share holder got that year if 10% of this amount went to URA as income tax.

10. The classroom floors at a nearby primary school are dusty and inhabitable for pupils. The head teacher f this school is planning to renovate all the seven classroom flours by covering them with tiles, but he lacks knowledge in cost estimation. each classroom measures $\boldsymbol{8m\ by\ 7m}$ while each tile measures $\boldsymbol{40cm\ by\ 38cm}$. given that each box of tiles is a square meter and it costs $\boldsymbol{UGX22,000}$. Determine

(a) how many boxes of tiles are required for all the seven class classrooms?
(b) the cost of buying the boxes of tiles.

SECTION B: (60 SCORES)

11. A triangle has vertices $\boldsymbol{A}\ (\mathbf{1},\mathbf{1})\ \boldsymbol{B}(\mathbf{2},\mathbf{4})$ and $\boldsymbol{C}(\mathbf{4},\mathbf{0})$.

The triangle undergoes a positive quarter turn of 90^{o} about the origin to be mapped onto triangle A' B' C'. The triangle A' B' C' is then reflected in the line $\boldsymbol{y = -x}$ to be mapped onto triangle $\boldsymbol{A''B''C''}$..

(a) Using a scale of 2cm I unit on both axes, plot the triangles ABC, A'B'C' and $\boldsymbol{A''B''C''}$ on the same graph. *(10 scores)*

(b) From your graph, describe a single transformation which is equivalent to the two successive transformations above. *(02 scores)*

(c) Find the matrix of the single transformation which maps triangle ABC on to triangle $\boldsymbol{A''B''C''}$. *(03 scores)*

12. In a $\Delta \boldsymbol{OAB}$, P and Q are points on OA and OB respectively such that

$\overline{\boldsymbol{OP}} = \frac{1}{3}\overline{\boldsymbol{OA}}$ and $\overline{\boldsymbol{OQ}} = \frac{1}{3}\overline{\boldsymbol{OB}}$. R is a point on $\overline{\boldsymbol{BP}}$ such that $\overline{\boldsymbol{BR}}$ = ¾ $\overline{\boldsymbol{BP}}$.

(a) Given that $\overline{\boldsymbol{OA}} = \breve{a}$ and $\overline{\boldsymbol{OB}} = \breve{b}$, express

(i) $\overline{\boldsymbol{PQ}}$

(ii) $\overline{\boldsymbol{BP}}$

(iii) $\overline{\boldsymbol{QR}}$ in terms of $\breve{a}$ and $\breve{b}$ *(09 scores)*

(b) Hence show that points A, R and Q are collinear. *(06 scores)*

13. Two towns Mbarara and Masaka are $\boldsymbol{110km}$ apart. A cyclist leaves Masaka at $\boldsymbol{9{:}00am}$ and travels towards Mbarara at an average speed of $\boldsymbol{25km/hr}$. One and half hours later a motorist leaves Mbarara and travels towards Masaka at an average speed of $\boldsymbol{50km/hr}$.

(a) On the same axes draw, a distance time graph for each motorist, use scale 2cm to represent 10km on vertical axis and 2cm to represent 1 hour on horizontal axis

(b) From your graph, determine

(i) the time when the two motorists met.

(ii) the distance from Masaka when the two Motorists met.

(iii) the difference in time of arrival for the two motorists. *(15 scores)*

14. A quantity **S** is partly constant and partly varies as the cube of **t**. when $\boldsymbol{t = 1, S = 5}$ and when $\boldsymbol{t = 2, S = 19}$,

(a) Form equation connecting $\boldsymbol{S}$ and $\boldsymbol{t}$

(b) Find the value of:

(i) $\boldsymbol{S}$ when $\boldsymbol{t = 10}$

(ii) the value of $\boldsymbol{t}$ when $\boldsymbol{S = 253.}$ *(15 scores)*

END