MUHANGA DISTRICT

SENIOR SIX 2ND TERM EXAMINATION, 2026

COMBINATION (LFK, HLP, HGL)

Time: 2 Hours 30 Minutes

Total Marks: 60

INSTRUCTIONS

- ✓ . Attempt ALL questions in Section A.
- ✓ . In Section B, answer ONLY TWO questions out of FOUR.
- ✓ . All working must be clearly shown.
- ✓ . Calculators are allowed.
- ✓ . Write your answers clearly.

SECTION A (30 Marks)

- ❖ **.Answer ALL questions**

1. The covariance between two variables is positive when: **2marks**

A. Both variables decrease together

B. One increases while the other decreases

C. Both variables increase together

D. There is no relationship

Correct answer: **C. Both variables increase together**

2. If r = -0.95, the relationship is: **2marks**

A. Weak positive

B. Strong negative

C. No correlation

D. Perfect positive

Correct answer: **B. Strong negative**

Explanation:
Since **r is close to −1**, the relationship is **strong negative correlation**.

3. The number of ways of arranging 5 different books on a shelf is: **2marks**

A. 25

B. 120

C. 60

D. 15

5!=5×4×3×2×1 =120= 120=120

Correct answer: **B. 120**

4. The value of 6_{P_2} is: **2marks**

A. 12

B. 30

C. 15

D. 20

$$6_{c_2} = \frac{6!}{21(6-2)!} = \frac{6*5}{2*1} = 15$$

Correct answer: **C. 15**

5. If two events A and B are mutually exclusive, then: **2marks**

A. $P(A \cap B) = 1$

B. $P(A \cup B) = 0$

C. $P(A \cap B) = 0$

D. They are independent

Correct answer: **C. $P(A \cap B) = 0$**

Explanation:
Mutually exclusive events **cannot occur together**.

True or False (6-8) QUESTIONS

6. If r = 1, there is perfect positive correlation. **1 mark**

If r = 1, there is perfect positive correlation

✔ **TRUE**

7. Covariance is affected by change of scale. **1 mark**

Covariance is affected by change of scale

✔ **TRUE**

8. 5_{C_2} = 10. **1 mark**

✔ **TRUE**

9. In a scatter diagram, negative slope shows positive correlation. **1 mark**

FALSE

Negative slope means **negative correlation**

Complete the following

10. Cov(x,y) = $\frac{\sum(\boldsymbol{X}-\bar{\boldsymbol{x}})(\boldsymbol{Y}-\bar{\boldsymbol{y}})}{\boldsymbol{n}}$, **2marks**

11. n_{C_r}= $\frac{\boldsymbol{n}!}{\boldsymbol{r}!(\boldsymbol{n}-\boldsymbol{r})!}$, **2marks**

12. The regression line of y on x is written as **y=a+bx**, **2marks**

Calculations (10 Marks)

13. Given that:

X	2	4	4
Y	3	5	7

a) Find the mean of x, **2marks**

Mean of X=$\frac{2+4+4}{3}$

$$\bar{\boldsymbol{x}} = \mathbf{3.33}$$

b) Find the mean of y, **2marks**

Mean of Y, $\bar{y} = \frac{3+5+6}{3}$

$$\bar{y} = \frac{15}{3} = 5$$

c) Find the covariance, **2marks**

x	y	$(x - \overline{x})$	$(y - \bar{y})$	$(x - \bar{x})(y - \bar{y})$
2	3	-1.33	-2	2.66
4	5	0.67	0	0
4	7	0.67	2	1.34
				$\sum = 4$

$$(x - \bar{x})(y - \bar{y}) = \frac{4}{3}$$

$$cov(x, y) = 1.33$$

14. a) In how many ways can 4 students be selected from 7 students?, **2marks**

(a) $\mathbf{7}_{c_4} = \frac{7!}{4!3!}$

$$\frac{7 * 6 * 5}{3 * 2 * 1} = 35$$

Answer is 35

b) In how many ways can 3 letters be arranged from the word CAT? **2marks**

Arrange letters of CAT

3! =3×2×1=6

Answer = 6 arrangements

SECTION B (30 Marks)

Answer ONLY TWO questions (15 Marks each)

Question 15: Given

X	1	2	3	4	5
Y	2	4	5	4	5

a) Find mean of x and y, covariance and correlation coefficient. **12 MARAKS**

Mean, $\overline{x} = \frac{1+2+3+4+5}{5} = 3$

$$\overline{y} = \frac{2 + 4 + 5 + 4 + 5}{5} = 4$$

x	y	$x - 3$	$y - 4$	$(x - 3)(y - 4)$
1	2	-2	-2	4
2	4	-1	0	0
3	5	0	1	0
4	4	1	0	0

5	**5**	**2**	**1**	**2**

$$\sum = (\boldsymbol{x} - \overline{\boldsymbol{x}})(\boldsymbol{y} - \overline{\boldsymbol{y}}) = \mathbf{6}$$

Covariance, $\boldsymbol{cov(x, y)} = \frac{\mathbf{6}}{\mathbf{5}} = \mathbf{1.2}$

Correlation coefficient, $\boldsymbol{r} = \frac{\boldsymbol{cov(x,y)}}{\boldsymbol{q_x q_y}}$

After calculation,

$\boldsymbol{r \approx 0.67}$

b) Interpret the result. **3MARKS**

Since **r = 0.67**

There is a **moderate positive correlation** between X and Y.

Question 16: Given

X	5	7	9	11
Y	3	4	6	8

a) Find regression line of y on x.**10 MARKS**

Means , $\overline{\boldsymbol{x}} = \frac{\mathbf{5+7+9+11}}{\mathbf{4}} = \mathbf{8}$

$$\overline{\boldsymbol{y}} = \frac{\mathbf{3 + 4 + 6 + 8}}{\mathbf{4}} = \mathbf{5.25}$$

$$\boldsymbol{b} = \frac{\sum(\boldsymbol{x} - \overline{\boldsymbol{x}})(\boldsymbol{y} - \overline{\boldsymbol{y}})}{\sum(\boldsymbol{x} - \overline{\boldsymbol{x}})^{\mathbf{2}}}$$

$$\boldsymbol{b} = \mathbf{0.85}$$

$$\boldsymbol{a} = \overline{\boldsymbol{y}} - \boldsymbol{b}\overline{\boldsymbol{x}}$$

$$\boldsymbol{a = 5.25 - (0.85 * 8)}$$

$$\boldsymbol{a = -1.55}$$

Regression equation equal to $\boldsymbol{y = 0.85x - 1.55}$

b) Estimate y when x=10. **2MARKS**

Estimate y when x = 10

$$\boldsymbol{y = 0.85 - 1.55}$$

$$\boldsymbol{y = 6.95}$$

c) Comment on the strength of correlation. **3 MARKS**

The data shows positive and strong correlation because Y increases as X increases.

Question 17:

a) Arrange 6 different books. **5MARKS**

Arrange 6 different books

$6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1$

Answer = 720 arrangements

b) Form committees of 3 from 8 people. **5MARKS**

$$\boldsymbol{8_{C_3} = \frac{8!}{3!\,5!}}$$

$$\boldsymbol{\frac{8 * 7 * 6}{3 * 2 * 1}}$$

$$= 56$$

Answer = 56 committees

c) Find arrangements of MATHEMATICS. **5MARKS**

Letters in MATHEMATICS = **11**

Repeated letters:

M = 2
A = 2
T = 2

$$\frac{\mathbf{11!}}{\mathbf{2!\,2!\,2!}}$$

$$= \mathbf{4,989,600}$$

Question 18:

In a class of 40 students: 25 study History, 18 study Geography, 10 study both.

a) Draw Venn diagram. **2marks**

Total students = 40

History = 25
Geography = 18
Both = 10

(a) Venn diagram values

Both = **10**

b) Find number studying only History. **4marks**

25−10=15

Only History = **15**

c) Find number studying only Geography.**4marks**

Only Geography

18−10=8

Only Geography = **8**

d) Find number studying neither. **5marks**

Neither

15+8+10=33

40−33=7

Neither = **7 student**