The Management University of Africa

MUA

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CERTIFICATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

CERTIFICATE COMMON UNIT

CCU 103: BASIC CALCULATIONS AND STATISTICS

DATE: 10TH DECEMBER 2024

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS

1. Write your registration number on the booklet.
2. **DO NOT** write in this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **FOUR** questions.
6. Question **ONE** carries **30 MARKS** and the rest carry **10 MARKS** each.
7. **Write all your answers in the examination answer booklet provided.**

QUESTION ONE

a) i) Differentiate between inclusive and exclusive forms of grouping data **(4 Marks)**

ii) Describe any 2 applications of statistics in real life situation **(4 Marks)**

b) Solve the following quadratic equation by factorization method **(4 Marks)**

$x^2 + 5x + 6 = 0$

c) Construct the chain base index numbers from the following data. **(4 Marks)**

Year	2002	2003	2004	2005	2006	2007
Price (Shs)	120	125	140	150	135	160

d) Using the data below

Marks	0-10	10-20	20-30	30-40	40-50
Frequency	5	10	15	8	7

Determine;

i) Quartile 1(Q1) **(3 marks)**

ii) Quartile 3(Q3) **(3 marks)**

iii) Semi- Interquartile Range **(1 mark)**

iv) Percentile 60(P60) **(3 marks)**

e) What compound rate of interest will be required to produce Ksh. 10,000 after five years with an initial investment of Ksh. 8,000. **(4 Marks)**

QUESTION TWO

Using the data below,

Class interval	No of residence (F)
0 – 20	6
20 – 40	18
40 – 60	32
60 – 80	48
80 – 100	27
100 – 120	13
120 – 140	2
	$\sum F = 146$

Calculate:

i) Mean **(3 Marks)**

ii) Mode **(3 Marks)**

iii) Standard Deviation **(4 Marks)**

QUESTION THREE

a) Solve the following simultaneous equation by substitution method **(4 marks)**

$2x - 3y = 8$

$3x + 4y = -5$

b) Solve following quadratic equation using complete square method

$2x^2 + 3x + 1 = 0$ **(4 marks)**

c) Solve for the value of y

$3/4\ y = -6$ **(2 marks)**

QUESTION FOUR

a) Give any two limitations of index numbers **(2 marks)**

b) Given below is a table of four commodities with the corresponding prices and quantities over the years (2012 and 2013)

	2012		2013	
	Price (Shs)	Quantity (bags)	Price (Shs)	Quantity (bags)
Maize	65	20	135	30
Wheat	95	8	160	7
Beans	150	5	320	8

Calculate:

i) Laspeyre's price index **(4 marks)**

ii) Paasche price index **(4 marks)**

QUESTION FIVE

a) Define the following terms as used in statistics

i) Probability **(2 marks)**

ii) Sample Space **(2 marks)**

iii) Mutually Exclusive Events **(2 marks)**

b) A box contains 3 red, and 5 black balls. If two balls are picked up randomly without replacement, what would be the probability of choosing at least one red ball? **(4 marks)**

QUESTION SIX

a) Define the following terms as used in statistics

i. Discount **(2 marks)**

ii. Commission **(2 marks)**

b) A man purchased a mini-combo set with a cash price of sh20,000 by paying a 10% down payment followed by 18 monthly payments of sh. 1500 each. Calculate

i. The amount financed **(4 Marks)**

ii. The interest **(2 marks)**

Formulas

Median =L + i/f (M-C)

Formula for finding Index numbers by *Laspeyres Method (L)*

$$P_{01} = \frac{\sum P_1 q_0}{\sum P_0 q_0} \times 100$$

Where: P_{01} = price index number
P_0 = price of the base year
q_0 = quantity of the base year
P_1 = price of the current year
q_1 = quantity of current year

Formula for finding Index numbers by *Paasche Method (P)*

$$P_{01} = \frac{\sum P_1 q_1}{\sum P_0 q_1} \times 100$$

Where: P_{01} = price index number
P_0 = price of the base year
q_0 = quantity of the base year
P_1 = price of the current year
q_1 = quantity of current year

Formula for finding Index numbers by *Fisher's Ideal Method*

$$P_{01} = \sqrt{\frac{\sum P_1q_0}{\sum P_0q_0} \times \frac{\sum P_1q_1}{\sum P_0q_1}} \times 100$$

$$P_{01} = \sqrt{(L \times P)}$$

Formula for finding Index numbers by *Marshall-Edge Worth method*

$$P_{01} = \frac{\sum(q_0 + q_1) P_1}{\sum(q_0 + q_1) P_0} \times 100$$

On opening the brackets;

$$P_{01} = \frac{\sum P_1q_0 + P_1q_1}{\sum P_0q_0 + P_0q_1} \times 100$$

Formula for finding standard deviation

$$\sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Simple interest formula

$A=S= P (1 + r n)$

Compound interest

$A = S = P (1 + r)^n$

Mean $\bar{x} = (\sum fx)/(\sum f)$

Computation method

$$\text{Mode} = L + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times c$$

The semi-interquartile range,

$$SIR = \frac{Q3 - Q1}{2}$$