The Management University of Africa

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CERTIFICATE UNIVERSITY EXAMINATION

SCHOOL OF MANAGEMENT AND LEADERSHIP

CERTIFICATE IN PROJECT MANAGEMENT

CCU 103: BASIC CALCULATIONS AND STATISTICS

DATE: 6th APRIL 2022

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)Explain the meaning of Statistics as a Branch of Mathematics **(2 marks)**

ii) Explain 4 applications of statistics in real life situations **(4 marks)**

iii) State 2 limitations of index numbers **(2 marks)**

b) Present the data below in frequency distribution: **(5 marks)**

107, 103, 95, 112, 95, 102, 116, 116, 98, 106, 125, 125, 97, 115, 104, 104, 122, 106, 117, 100, 124, 115, 108, 98, 111, 107, 115, 118, 108, 110, 122

c) Using the data below

IQ (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

Determine

i) Mean **(4 marks)**
ii) Median **(3 marks)**
iii) Mode **(3 marks)**

d) A pot contains 6 balls, two of which are green and four are red. Two balls are drawn at random from the pot one at a time without replacement. What is the probability that the two balls are of different colors. **(4marks)**

e) Mary earns Ksh. 25,000 a month plus some money by commission rates. Additionally, she gets 6% of everything she sells. Mary sold Ksh. 85,000 worth of items this month, what is her salary for this month? **(3marks)**

QUESTION TWO

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

PRODUCT	TIME			
	2012		2013	
	Quantity (Kg)	Price (shs)	Quantity (Kg)	Price (shs)
Bread	5	5	7	6.5
Eggs	6	7.75	10	8.8
Soap	4	9.63	6	10.75
Sugar	9	12.5	9	12.75

Calculate:

a) Laspeyre's price index and interpret it **(5 marks)**
b) Paasche price index and interpret it **(5marks)**

QUESTION THREE

The following data shows the amount of unsecured personal loans in thousands of shillings from a commercial bank

55, 70, 57, 73, 55, 59, 64, 72, 60, 48, 58, 54, 69, 51, 63, 78, 75, 64, 65, 57, 71, 78, 76, 62, 49, 66, 62, 76, 61, 63, 63, 76, 52, 76, 71, 61, 53, 56, 67, 71

Required:

a) A frequency distribution of the data with 5 as a class interval size and 45 as the lower class interval of the first class and 79 as the upper limit for the last class(use an inclusive class interval) **(4 marks)**

b) Median of the personal loans **(3 marks)**

c) Mean of the personal loans **(3 marks)**

QUESTION FOUR

Find solution using completing square method

a) $2x^2 + 8x - 24 = 0$ **(3marks)**

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

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

$2x + 3y = -9$

$x + 4y = 6$

QUESTION FIVE

a) A business lady invested Ksh. 170,000 in a bank at a simple interest rate of 6% per annum. Calculate the number of years it will take for the investment to amount to Ksh. 210,800. **(4 Marks)**

b) 2. A fair, five sided spinner numbered 1 to 5 is rolled.

i. Calculate the probability that the spinner will land on a 5? **(2 Marks)**

ii. Calculate the probability that the spinner will land on a 4 or a 5? **(2 Marks)**

iii. Calculate the probability that the spinner will land on an odd number **(2 Marks)**

QUESTION SIX

a) Define the following terms

(i) Discount **(2 marks)**

(ii) Commission **(2 marks)**

(iii) Compound interest **(2 marks)**

b) Tom Omino sells goods on commission basis for a Nairobi firm. Commission is paid on sales as follows in addition to his monthly salary of Sh. 2,000. On the first Sh. 50,000 of sales: Nothing. On the next Sh. 100,000 of sales 4% on the balance of sales 5%. He sold goods worth Sh.350,000 during November 2019. Calculate Tom Omino's total income for November 2019 **(4 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*

$$P_{01} = \sqrt{\frac{\sum P_1 q_0}{\sum P_0 q_0} \times \frac{\sum P_1 q_1}{\sum P_0 q_1}} \times 100$$

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

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 $\bar{x} = \frac{\Sigma fx}{\Sigma f}$

Computation method

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

The semi-interquartile range,

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