The Management University of Africa

MUA

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DIPLOMA UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DIPLOMA COMMON UNIT

DCU 103: BASIC BUSINESS STATISTICS

DATE: 6TH AUGUST 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) Explain the following terms **(5 marks)**

(i) Statistics
(ii) Matrix
(iii) Probability
(iv) index number
(v) Decision theory

b) calculate the value of Q1,Q2,Q3,P40 from the following data

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	2	7	21	25	30	35	28	12

i) Q1 **(2 marks)**
ii) Q3 **(2 marks)**
iii) D3 **(3 marks)**
iv) P40 **(3 marks)**

c) Solve the following systems of linear simultaneous equations by Cramers' rule **(4 marks)**

$x_1 + 2x_2 + 4x_3 = 4$

$2x_1 + x_3 = 3$

$3x_2 + x_3 = 2$

d) A number of families at a particular location were measured by the number of children to give the following frequency distribution:

No. of children:	0	1	2	3	4	5 or more
No. of families:	12	28	22	8	2	2

Use this information to calculate the probability that another family of this type will have

(i) 2 **(2 marks)**
(ii) (ii) 3 or more **(2 marks)**
(iii) (iii) less than 2 children **(2 marks)**

e) A computer whose cost is shs 220,000 will depreciate to a value of shs 12,000 in 5 years. Find
(i) The depreciation rate **(2 marks)**

(ii) The value of the computer at the end of the third year **(3 marks)**

QUESTION TWO

From the following data, calculate index numbers for ~~2020~~ 2013 taking ~~2019~~ 2012 as the base and using the following formulae;

Products	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

a) Laspeyres **(3 marks)**

b) Paasche **(3 marks)**

c) Fishers **(4 marks)**

QUESTION THREE

The production costs, in dollars, per week of producing xx widgets is given by,

$C(x)=4000-32x+0.08x2+0.00006x3$

and the demand function for the widgets is given by,

$p(x)=250+0.02x-0.001x2$

What is the marginal cost, marginal revenue and marginal profit when x=200 and x=400? What do these numbers tell you about the cost, revenue and profit? **(10 marks)**

QUESTION FOUR

a) A group operates a chain of filling stations in each of which are employed cashiers, attendants and mechanics as shown below.

Type of filling station

	Caltex	kobil	kenol
Cashier	4	2	1
Attendants	12	6	3
Mechanics	6	4	2

Number of filling station

	Nairobi	Kisumu	Mombasa
Caltex	3	5	12
Kobil	7	8	4
Kenol	5	4	6

How many various types of staff are employed in Nairobi, Mombasa and Kisumu?

(5 marks)

b)The matrix of C of cofactors is

$$\begin{pmatrix} 13 & 11 & -7 \\ 1 & 31 & 7 \\ 16 & 6 & 14 \end{pmatrix}$$

$$C^T = \begin{pmatrix} 13 & 1 & 16 \\ 11 & 31 & 6 \\ -7 & 7 & 14 \end{pmatrix}$$ = Adjoint of the original matrix of coefficients

The original matrix of coefficients

$$= \begin{pmatrix} 4 & 1 & -5 \\ -2 & 3 & 1 \\ 3 & -1 & 4 \end{pmatrix}$$

Find:

a)Determinant of the original matrix **(2 marks)**

b)Inverse of the matrix **(3 marks)**

QUESTION FIVE

a) Explain five Steps of Decision Theory **(5 marks)**

b) State five application of linear programming **(5 Marks)**

QUESTION SIX

a) What would $1000 become in a saving account at 3% per year for 3 years when the interest is not compounded (simple interest)? What would the same amount become after 3 years with the same rate but compounded annually?

(5 marks)

b) What would $1000 become in a saving account at 3% per year for 3 years when the interest is not compounded (simple interest)? What would the same amount become after 3 years with the same rate but compounded annually?

(5 marks)

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BASIC BUSINESS STATISTICS FORMULAE

Formula method for finding the median

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*