University of choice

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)
SCHOOL OF AGRICULTURE, VETERINARY SCIENCES AND TECHNOLOGY (SAVET)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR

MAIN EXAMS
OF
DIPLOMA OF (GENERAL AGRICULTURE & HORTICULTURE)

COURSE CODE: DAG 060

COURSE TITLE: INTRODUCTION TO STATISTICS AND PROBABILITY

DATE: 23.04.2024 **TIME: 3-5PM**

INSTRUCTIONS TO CANDIDATES

This paper is divided into two sections, **A and B**. Answer ALL Questions in SECTION A and any Two in SECTION B

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over

SECTION A: Answer all questions (30 Marks)

QUESTION ONE

a) Distinguish between the following terms as used in statistics **(4mks)**

i. Population and sample

ii. Primary data and secondary data

b) 10% of the bulbs produced in a factory are of red colour and 2% are red and defective. If one bulb is picked up at random, determine the probability of its being defective if it is red. **(3mks)**

c) Using the following data to construct a stem and leaf plot **(3mks)**

Observation	A	B	C	D	E	F	G	H	I	J	K	L	M
Values	42	51	30	44	26	38	49	23	35	42	38	27	33

d) First four moments about mean of a distribution are 0, 2.5, 0.7 and 18.75. Find coefficient of skewness and kurtosis. **(4mks)**

e) Using the data shown in the table below,

Marks	0-10	10-20	20-30	30-40	40-50
Number of students	10	25	30	20	15

Calculate;

i. Mean deviation **(4mks)**

ii. Semi-inter quartile range **(6mks)**

f) A discrete random variable X has the following probability distribution:

X	1	2	3	4	5	6	7
$P(X = x)$	C	2C	2C	3C	C^2	$2C^2$	$7C^2+C$

Find the value of C. Also find the mean and variance of the distribution **(6mks)**

SECTION B: Answer any two questions (40 marks)

QUESTION TWO

a) State and prove Bayes Theorem **(4mks)**

b) The ranks of the same 15 students in Mathematics and Agriculture were as follows, the two numbers within the brackets denoting the ranks of the same student; (1,10), (2,7), (3,2), (4,6), (5,4), (6,8), (7,3), (8,1), (9,11), (10,15), (11,9), (12,5), (13,14), (14,12), (15,13). Find the relationship of students marks using Spearman's Rank Correlation Method **(5mks)**

c) The following table gives the distribution of daily wages of 900 workers in Agriculture Farm. If the median of the distribution is ksh. 59.25.

Wages	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Workers	120	x	200	y	185

i) Find the value of x and y **(3mks)**

ii) Calculate the coefficient of variation **(8mks)**

QUESTION THREE

a) State and explain types of correlation **(3mks)**

b) A physician wishes to know whether there is a relationship between a father's weight and his son's weight (in kg). The data is given in the table below.

Father's weight (x)	65	63	67	64	68	62	70	66	68	67	69	71
Son's weight (y)	68	66	68	65	69	66	68	65	71	67	68	70

Fit a least square regression model to the data linking father's weight to son's weight. Comment on the relationship **(9mks)**

c) The table below shows the distribution of wages across the different age groups in a life is Precious, a non-Governmental organization whose role is to alleviate poverty in a certain community.

Wages	40-49	50-59	60-69	70-79	80-89	90-99
Number of Workers	12	10	15	17	8	3

Determine;

i) Harmonic Mean for the distribution **(4mks)**

ii) Geometric Mean for the distribution **(4mks)**

QUESTION FOUR

a) State and explain three probability sampling methods **(6mks)**

b) Calculate price index number for 2016 of following data by weighted aggregative method

Commodity	Price (2012)	Quantity (2012)	Price (2016)	Quantity (2016)
A	4	20	6	10
B	3	15	5	23
C	2	25	3	15
D	5	10	4	15

Using; **(8mks)**

i. Laspeyres method

ii. Paasche's method

iii. Fishers method

c) Two journalists labeled A and B write newspapers columns advising readers which beverage offer good value for money. They teste a number of beverages and then estimate the retail prices of the corresponding bottles of beverages. Their estimates are as shown in the following table.

Beverage	M	N	O	P	Q	R	S	T	U
A	7	3	25	50	2	5	17	80	12
B	9	19	20	25	9	10	4	26	60

i. Calculate the value of the product moment correlation coefficient between *A* and *B* estimates **(5mks)**

ii. Interpret briefly the value of the correlation coefficient **(1mks)**

QUESTION FIVE

a) State the properties of probability **(3mks)**

b) In a village of 1000 farmers who plant Maize (M), Beans (B) and Carrots (C) respectively. The farmers who plant maize are 300, beans 350, carrots 450, maize and beans 100, maize and carrots 150 and beans and carrots 75.

i) Represent this information on a Venn diagram if 200 plant none **(2mks)**

ii) Find the probability of farmers who plant all the three crops **(3mks)**

c) A petrol station sells three types of fuel: Lead Replacement Petrol (LRP), unleaded petrol and diesel. The probability that a randomly selected customer will buy a particular fuel is shown in the table below.

Fuel	Probability
LRP	0.15
Unleaded	0.65
Diesel	0.20

I. Find the probability that of two randomly selected customers: **(5mks)**

i) Both will buy diesel

ii) Exactly one will buy diesel

II. Find the probability that of the three selected customers **(7mks)**

i) All will buy unleaded

ii) Exactly two will buy diesel

iii) One will buy LRP, one will buy leaded and one will buy diesel