KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS, 2022/2023 ACADEMIC YEAR
FIRST YEAR, SECOND SEMESTER EXAMINATIONS
FOR THE DEGREE OF BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

KMA 2115 - BUSINESS STATISTICS

Date: 11th April 2022
Time: 11.30am-1.30pm

INSTRUCTIONS TO CANDIDATES
ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Define the following terms as used in probability and statistics

   i)   Population
   ii) Censes
   iii) Sample
   iv) Sample space
   v)   Event.   (5 marks)

b) The data on scores are as follows;

   16 14 15 13 12 14 16 15 15 14 17 16 13 16 15 14 18 13 15 17

   i) Construct an ungrouped frequency distribution (2 marks)

   ii) Use the frequency distribution in (i) to compute the mean and variance of the score.(4 marks)

c) A box has 4 green and 6 red apples of the same size. Anyang'o has two friends which she wants to award them with an apple each for visiting her. Suppose that she picks two apples at random without replacement and one at a time, what is the probability that;

   i)   She will award both friends will apples of the same colour.   (3 marks)

   ii)   None of the friends will get a red apple.   (2 marks)

d) Suppose that $n = 5$, $\sum X = 15$, $\sum X^2 = 55$, $\sum Y = 175$ and $\sum XY = 655$. Find the regression line of Y on X and predict Y when $X = 7$.   (6 marks)

e) The table below shows the prices of four commodities for the current and the base year. Use

items	Base year		Current year	
	Price	quantity	Price	quantity
Sugar	1	6	5	8
Salt	2	7	4	7
Flour	3	8	3	6
soap	4	9	2	5

Laspeyre's index to calculate the index number for the current year. (5 marks)

f) A manager is interested in knowing whether the mean sales of her employer is 100 units or not. She decided to see how the employees have been performing in the last 20 days and draw a statistical conclusion from it. These 20 days' sampled had a mean of 90 and a variance 225. Carry out a statistical test at 5% level of significance to check whether the mean sales is actually 100 0r not.

(5 marks)

QUESTION TWO (20 MARKS)

a) Define the following terms as used in decision theory

i) Action. (1 mark)

ii) Alternatives. (1 mark)

iii) Payoffs. (1 mark)

b) Decision making process is usually under some situations known as decision making environment. Highlight Four of this four these environments. (4 marks)

c) An agricultural company wants to decide which commodity should stock to get maximum profit. It was supplied with the following information. The probability that monsoon will **be excess, normal and deficient is 0.40, 0.30 and 0.30.** The estimated profit or loss three commodities in respect of these different kinds of monsoon are:

Monsoon	Profit per Tone		
	Excess	Normal	Deficient
Rice	10, 000	-4,000	15,000
Wheat	4, 000	-3, 000	8,000
Maize	4, 000	1000	-1000

I.   Determine the optimal decision under each of the following decision criteria and show how you arrived at it:

i) Maximax. (2 marks)

ii) Maximin. (2 marks)

iii) Hurwitz Alpha criterion $\alpha=0.8$. (3 marks)

iv) EMV. (4 marks)

II. Determine EVPI. (4 marks)

QUESTION THREE (20 MARKS)

a) Discuss the FOUR components of time series? (8 marks)

b) Highlight the roles of time series. (4 marks)

c) A time series data for the countries import over a period of 6 years is as shown below

Year	2014	2015	2016	2017	2018	2019
Imports (Billions)	25	40	60	65	55	90

    (i) Use the method of semi averages to determine the trend line for the data. (4 marks)

    (ii) Plot these observations showing the trend line. (2 marks)

    (iii) Predict the imports for the year 2023. (2 marks)

QUESTION FOUR (20 MARKS)

a) The following tables shows the distribution of marks in an exam marked out of 40 for 50 students

Class	10-14	15-19	20-24	25-29	30-34
frequency	7	11	14	13	5

Estimate;

    i) Median. (3 marks)

    ii) Mode. (2 marks)

    iii) Inter-quartile range. (3 marks)

    iv) Mean. (2 marks)

    v) Standard deviation. (3 marks)

b) Three machines A, B and C produces 50%, 30% and 20% respectively of the total number of items in a factory. The percentage of defective outputs of these machines are 3%, 4% and 5% respectively. If an item is selected at random:

    i) Find the probability that it is defective. (3 marks)

    ii) And found to be defective, what is the probability that it was produced by machine A? (3 marks)

c) Distinguish between mutually exclusive and independent events. (2 marks)

QUESTION FIVE (20 MARKS)

a) The following data shows the yearly input (in shillings) and the yearly profit of a certain production company.

Year	2015	2016	2017	2018	2019	2020	2021
Input (millions)	21	25	29	35	33	27	30
Profit (millions)	10	15	30	25	40	20	35

    i) Determine a simple linear regression equation of profits on Inputs. (6 marks)

    ii) Use the equation in i) to predict the profits when the input is 50,000,000. (2 marks)

    iii) Determine the analysis of variance (ANOVA) table based on the model. (6 marks)

b) A random sample of 17 secondary teachers in Makueni county has a mean annual income of $35,800 and a standard deviation of $7,800. In Kericho county, a random sample of 18 secondary teachers has a mean annual income of $35,100 and a standard deviation of $7,375. Due to hardships, it is believed that teachers in Makueni county earn more than those in Kericho county. Assuming the population variances are equal, Test the claim at $\alpha = 0.01$ level of significance. (6 marks)