UGANDA MARTYRS UNIVERSITY

UNIVERSITY EXAMINATIONS

FACULTY OF EDUCATION

DEPARTMENT OF ECONOMICS

YEAR ONE SEMESTER ONE 2023/2024 FINAL ASSESMENT

COURSE CODE : STA 1101

COURSE UNIT : INTRODUCTION TO STATISTICS FOR ECONOMICS

PROGRAM : ECON 1

DATE: Friday 8/12/23

TIME: 9.30-12.30 pm

DURATION: 3 HOURS

Instructions:

1. This examination consists of **SIX** questions.
2. Attempt any **FOUR** questions. Each question caries 25 marks.
3. Do not write anything on the questions paper.
4. Carefully read through ALL the questions before attempting.
5. No **names** should be written anywhere on the examination booklet.
6. Ensure your work is **clear** and **readable**. Untidy work shall be penalized.
7. Any type of examination Malpractice will lead to automatic disqualification.
8. Ensure that your **Registration number** is indicated on all pages of the examination answer booklet.
9. Remember to indicate the question numbers you have attempted.

QUESTION ONE

A company manufactures and sells a single product. Estimated sales, costs and selling prices for the coming year are as follows:

Sales units	Probability	Selling price	Probability	Variable cost/ unit	Probability
30,000	0.3	400	0.2	200	0.1
45,000	0.2	500	0.4	250	0.3
60,000	0.1	600	0.2	300	0.3
55,000	0.2	700	0.1	350	0.2
65,000	a	800	b	400	c

Given that the fixed costs per year are 7,000,000/=, 8,000,000/= and 10,000,000/= with associated probabilities of 0.4, 0.3 and 0.3 respectively. Determine the;

(i) Values of a, b and c **(9 marks)**

(ii) Total revenue of the firm **(4 marks)**

(iii) Total costs of the firm **(4 marks)**

(iv) Expected annual profit of the firm **(4 marks)**

(v) Advise the company **(2 marks)**

(vi) Worst possible scenario in the upcoming year **(2 marks)**

QUESTION TWO

(i) Distinguish the following terms as used in statistics using relevant examples.

(a) A sample and a population **(4 marks)**

(b) A parameter and a statistic **(4 marks)**

(ii) Why do you think most researchers choose to use a sample instead of the population in their surveys? **(2 marks)**

(iii) The data below shows the monthly salaries in dollars extracted from the accounts department of an organization.

146, 135, 217, 120, 290, 138, 135, 138, 209, 246 and 320

Using the data above, find the;

(a) Variance **(5 marks)**

(b) Standard deviation **(1 mark)**

(c) Mean deviation of the data **(4 marks)**

(d) What is the usefulness of variance? **(1 mark)**

(e) Describe two disadvantages of the variance. **(4 marks)**

QUESTION THREE

(a) Distinguish between certainty and un-deterministic situations using relevant examples. **(4 marks)**

(b) What are the three different ways of stating probability? **(3 marks)**

(c) Write short notes on each of the following ways of measuring probabilities.

(i) Mathematical certainty. **(2 marks)**

(ii) Analysis of past experience. **(3 marks)**

(iii) Research or survey studies. **(3 marks)**

(d) Coca Cola Company produces two types of coke, coke zero and coke sugar. During the product mix survey, it subjected 6,000 crates of each type to particular markets of central region and western region. In the central region, 3,000 crates of coke sugar were consumed and 4,000 crates of coke zero were consumed. In the western region, 7,000

crates of coke sugar were consumed and 3,500 crates of coke zero were consumed. From the above survey, what would you advise management of coca cola company?

(10 marks)

QUESTION FOUR

(a) What is meant by measures of dispersion as used in statistics? **(1 mark)**

(b) Name any three measures of dispersion. **(3 marks)**

(c) The production of each manufacturing department in a company is monitored weekly to establish productivity bonuses to be paid to the departmental members of staff. 350 items have to be produced each week before a bonus is paid. The production in one department over a 40 week period is shown below

493	478	475	476	482	481	483	518	466	458
460	460	471	468	473	475	516	488	476	472
491	493	495	497	499	513	517	548	567	570
577	560	565	571	568	533	540	546	520	465

(i) Construct a frequency distribution table using a class width of 20 starting with a class of 450-469; **(10 marks)**

(ii) Find the mean number of items produced **(2 marks)**

(iii) Find the median number of items **(4 marks)**

(iv) Plot the histogram and use it to find the modal number of items produced. **(5 marks)**

QUESTION FIVE

(a) For a regression line $y = a + bx$, show that;

$$a = \frac{\sum y - b\sum x}{n}$$

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2}$$

(7 marks)

(b) A new computer circuit was tested and the times (in micro seconds) required to carry out different subroutines were recorded as follows.

x	1	2	3	4
y	1	5	8	13

(i) Calculate the values of a and b for the given data for the regression line $y = a + bx$ **(6 marks)**

(ii) Hence estimate y when $x = 2.5$ **(2 marks)**

(iii) Sketch the scatter diagram for the data above. **(4 marks)**

(iv) Is there a linear relationship between the variables x and y? **(1 mark)**

QUESTION SIX

(a) Using relevant examples, differentiate between correlation analysis and regression analysis. **(4 marks)**

(b) A company wants to know if there is a significant relationship between its advertising expenditures and its sales volume. A lag time of one month will be used because sales are expected to lag behind actual advertising expenditures. Data was collected for a six month period and is shown the following table. All figures are in thousands of dollars.

ADVERTISING EXPENDITURE	SALES VOLUME
4.2	27.1
6.1	30.4
3.9	25.0
5.7	29.7
7.3	40.1
5.9	28.8

(i) Identify the dependent and independent variables. **(2 marks)**

(ii) Plot the scatter diagram. **(6 marks)**

(iii) Draw the line of best fit. **(2 marks)**

(iv) Comment on your graph. **(1 mark)**

(v) Determine the spearman's rank correlation coefficient correlation between advertising expenditure and sales volume. **(8 marks)**

(vi) Comment on your answer. **(2 marks)**

SUCCESS