



# THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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**MAIN EXAMINATION**

**SEPTEMBER – DECEMBER 2019 TRIMESTER**

**SCHOOL OF BUSINESS**

**DEPARTMENT OF ACCOUNTING AND FINANCE**

**REGULAR PROGRAMME**

**CMS 211: INTRODUCTION TO BUSINESS STATISTICS**

**Date: DECEMBER 2019**

**Duration: 2 Hours**

**INSTRUCTIONS: Answer Question ONE and any other TWO Questions**

- Q1 a) Briefly describe or make a distinction between the following statistical terms:
- (i) Descriptive statistical techniques **(2 marks)**
  - (ii) Statistical inference versus statement of reliability **(2 marks)**
  - (iii) Nominal versus Ratio data measurement levels/categories **(2 marks)**
  - (iv) Discrete versus continuous numerical data **(2 marks)**
  - (v) Spearman's rank correlation coefficient versus Pearson's moment coefficient of correlation **(2 marks)**
- b) A company has four departments; A, B, C, and D. Revenue generated by these departments were presented by a pie chart. The size of the central angle representing revenue from B is  $90^\circ$  and the size of the central angle representing revenue from department A is twice that of B. Department C generated twice as much revenue as department D. If the revenue generated by department A was Kshs.60 million, determine the revenues generated by departments B, C, and D, respectively.

**(6**

**marks)**

- c) Consider the data below:

	<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>	<b>Combined Group</b>
<b>Size</b>	6	<b>a</b>	10	20
<b>Mean</b>	<b>b</b>	10	4	5.5

<b>Standard Deviation</b>	1	3	2	<b>c</b>
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**Required:**

Work out the missing values marked **a** (i.e Size of Group 2), **b** (Mean of Group 10, and **c** (i.e the Standard Deviation of the Combined group)

**(8 marks)**

- c) The data below is on prices of second-hand photocopiers and the number of units sold for the last ten weeks.

Price (Kshs 000s)	0.75	0.4	0.8	0.1	0.5
No. of units	2	8	1	6	3

**Required:**

- (i) Determine the median and mode of this data **(2 marks)**  
(ii) Determine the interquartile range of this data **(4 marks)**

- Q2. The monthly salaries of all the employees working for company Z were classified as follows:

Job Group	K	L	M	N
Salary Group (Kshs '000s)	10 - 20	20 - 30	30 - 40	40 - 50
No. of employees	2	9	6	3

**Required:**

- (a) Determine the mean, modal, and median salary of these employees' salaries. **(12 marks)**  
(b) It was later decided that more employees in Job Group K were needed due to the workload on the current employees in this group. It was further decided that the lowest monthly pay of the middle 50% of the workers' salaries should be Kshs 17,000 after the new employees were engaged. Help the company to determine the number of new employees it must engage in order to achieve its objective. **(8 marks)**

- Q3. a) Explain why the standard deviation is a better measure of dispersion than the mean deviation of a set observations.

**(2 marks)**

- b) The following data was extracted from the records of County Y in Kenya.

Annual Profit (Ksh M)	200 - 400	400 - 600	600 - 800	800 - 1000	1000 - 1200
Number of Companies	5	7	78	6	4

**Required**

- (i) Compute the mean deviation of the data **(5 marks)**
- (ii) Determine the standard deviation of the displayed data **(5 marks)**
- (iii) If the Governor of County Y has proposed some tax refund to companies who earned a profit in the range of a quartile deviation away from the mean profit, determine the range of profit over which a company would qualify for a tax refund, and hence estimate the approximate number of companies that would be eligible for a tax refund. **(8 marks)**

- Q4. a) A national consumer protection society investigates seven brands of paint to determine their quality relative to price. The society's conclusions were ranked according to the following table:

Brand	T	U	V	W	X	Y	Z
Price/litre	1.92	1.58	1.35	1.60	2.05	1.39	1.77
Quality ranking	2	6	7	4	3	5	1

**Required:**

Using Spearman's rank correlation coefficient comment on whether the consumer gets value for money.

**(6 marks)**

- b) Ann, who is a statistician at Auto Shape Ltd collected data on the monthly output level in units(x) and the monthly total production cost in Shs a ten-month period. She used a computer to obtain the following results:

$$n = 10, \quad \sum x^2 = 258,869,000, \quad \sum x = 47,800, \quad \sum y = 29,100, \\ \sum y^2 = 103,710,000, \quad \sum xy = 120,230,000$$

**Required:**

- (i) Determine the regression equation for estimating the cost for a monthly output of a given number of units. **(6 marks)**

- (ii) Calculate the coefficient of correlation and coefficient of determination and interpret these values in relation to the regression model developed above.

(4

**marks)**

- (iii) The supervisor later discovered that the monthly output of 1500 units and 3500 units and their respective costs of shs 6000 and shs 4200 had erroneously been recorded as 5100 units and 5300 units with respective costs of shs 600 and shs 4200. Make the appropriate adjustments to the total number of units ( $\sum x = 47,800$ ) and the total cost ( $\sum y = 29,100$ ) to obtain the correct values. (4 marks)

### STATISTICAL FORMULAE

$$(i) \quad M_d = L_{md} + \frac{\left(\frac{n}{2} - cf\right)}{f_{md}} i,$$

$$(ii) \quad M_o = L_{mo} + \left(\frac{d_1}{d_1 + d_2}\right) i,$$

$$(ii) \quad \sigma = \sqrt{\frac{\sum_i^n (x_i - \mu)^2}{n}},$$

$$(iv) \quad \sigma = i \sqrt{\frac{\sum fd}{n} - \frac{(\sum fd)^2}{n^2}},$$

$$(v) \quad S = \sqrt{\frac{\sum_i^n (x_i - \bar{x})^2}{n-1}}$$

$$(vi) \quad \sigma = \sqrt{\frac{\sum f(m - \mu)^2}{n}},$$

$$(vii) \quad Q_3 = LQ_3 + \frac{\left(\frac{3n}{4} - cf\right)}{fQ_3} i$$

$$(viii) \quad b = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2},$$

$$(ix) \quad a = \bar{y} - b\bar{x}$$

(x)

$$r_{xy} = \frac{\sum xy - n\bar{x}\bar{y}}{\sqrt{[(\sum x^2 - n\bar{x}^2)(\sum y^2 - n\bar{y}^2)]}}$$

$$(xi) \quad r_s = 1 - \frac{6 \sum d^2}{n(n-1)}$$

$$(xii) \quad S_e = \sqrt{\frac{\sum y^2 - a \sum y - b \sum xy}{n-2}}$$

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