CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF BUSINESS ADMINISTRATION / MSC.PROCUREMENT & LOGISTICS MANAGEMENT

MSOM 821 : QUANTITATIVE METHODS

STREAMS: MBA /MSC.PLM Y1 S1 (ODEL)

TIME:

3 HOURS

DAY/DATE: THURSDAY 8/4/2021 **2.30 AM – 5.30PM**

INSTRUCTIONS:

- Answer Question ONE and Any Other THREE Questions.

QUESTION ONE (40 MARKS)

(a) Explain the significance of quantitative methods in management. [6 Marks]

(b) Solve for X, Y and Z in the matrix equation.

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix} \begin{pmatrix} X \\ Y \\ Z \end{pmatrix} = \begin{bmatrix} 3 \\ 4 \\ 8 \end{bmatrix}$$ [6 Marks]

(c) The table below reports data on prostate cancer death rates (per 100,000) and dietary fat consumption (g/day) for 6 countries. The data are shown in Table

Country No.	X	Y
1	0.9	38
2	1.3	29
3	1.6	42
4	4.5	57
5	4.8	96
6	5.4	47

Scale: X = Dietary fat consumption
Y = Death rate

i. Use the table to compute and interpret the correlation coefficient for the data. [6 Marks]
ii. Test the significance of correlation coefficient at 5% level. [4 Marks]
iii. Fit a simple linear regression model for the data. [4 Marks]

iv. Interprete your intercept and coefficient of X in (iv) above. [4 Marks]

(d) The information given below relates to treatment mode of 200 patients suffering from COVID-19 disease.

	No. of patients	
Treatment mode	Favorable Response	No Response
Home-based	60	20
Hospital	70	50

Required:

i. Using chi-square test, state whether there is association between treatment mode and response by patients at 5% level of significance. [6 Marks]

ii. Will your conclusion in (i) above be different if the level of significance is 1% instead? [4 Marks]

QUESTION TWO

(a) Discuss important assumptions of the Linear programming model. [6 Marks]
(b) Explain the following concepts as used in hypothesis testing
(i) Significance level [2 Marks]
(ii) Parametric test [2 Marks]
(iii) A statsitic [2 Marks]

(c) A sales man has the following record of sales during three months for three items A, B and C which have different rates of commission.

Months	Sales in units			Total sales (KSh.)
	A	B	C	
January	90	100	20	800
February	130	50	40	900
March	60	100	30	850

Let X_1, X_2 and X_3 be the selling price per unit in sh. On item A, B and C respectively.

(d) Formulate a system of simultaneous equations for the above information. [4 Marks]
(e) Use matrix algebra to determine the selling price per unit of each item. [4 Marks]

QUESTION THREE

a) The total revenue function for a product is given by TR= 4*x*. A monopolist finds that the total cost is C= 250 + $0.005x^2$ where X is the number of units sold.

Required:

(i) How many units must be sold to maximize profit? [6 Marks]

(ii) Compute the selling price at this level of production [2 Marks]

(iii) Determine the maximum possible profit [2 Marks]

(b) Distinguish between the Null and alternative hypothesis. [4 Marks]

(c) Ten new players of the national soccer team were put through a strenuous physical training programme by their coach. Their weights (in kg) were recorded before and after training, with the following results:

Player Number	Weight before training	Weight after training
1	127	135
2	195	200
3	162	160
4	170	182
5	143	147
6	205	200
7	168	172
8	175	186
9	197	194
10	136	141

Using 5% level of significance, can it be concluded that the training programme has effect on average weight of the players? [6 Marks]

QUESTION FOUR

a) Outline the procedure a researcher would take to test hypothesis. [6 Marks]
b) A study was conducted to determine if introduction of Queue Management System (QMS) by micro-finance firms in Meru County had influence on the number of customers served on daily basis. The first group of seven MFI's that had adopted QMS services recorded 120, 150, 110, 160 140, 140, and 160 customers per day. Another group of five MFI's which had not adopted the technology registered 80, 100, 140, 100 and 130 customers per day. Test at 5

percent level whether there is significant evidence that introduction of QMS had increased the number of customers served per day. [6 Marks]

c) The average cost function of a product is given by AC (x) = $x^3 - \frac{615x^2}{2} + 15750x + 1800$

where

x is the number of units produced. Determine

i. The total cost of producing 10 units [4 Marks]

ii. The level of output at which Average cost is minimized. [4 Marks]

QUESTION FIVE

(a) Highlight the significance of regression analysis [14 Marks]

(b) The following regression results were obtained from an empirical investigation to establish predictors for stock returns in emerging capital markets.

$\widehat{Returns}$=	.284 +	0.092 Market risk + 0.0041 Firm size – 0.022 Firm value		
P-value	(.104)	(.007)	(.117)	(.000)
Se	(2.204)	(.0154)	(.000853)	(.0045)
			n = 526, R^2 = .316	

Where p-values and standard errors appear in parentheses below the estimated coefficients.

Required:

(i) Compute the t-statistic for firm value variable [2 Marks]

(ii) Interpret R-square of the model [2 Marks]

(iii) Interpret the intercept term and coefficients on each independent variable.[4 Marks]

(iv) Use p-values to identify significant predictors of stock returns. [2 Marks]

(c) Three merchants R, S and M ordered laptops of different brands from Dubai: Hp, Acer and Lenovo. R purchased 10 pieces of Hp, 7 pieces of Acer and 3 of Lenovo. S purchased 4 pieces of Hp, 8 pieces of Acer and 10 pieces of Lenovo. M purchased 4 pieces of Hp 7 pieces of Acer and 8 pieces of Lenovo. The manufacturer's price for one piece of Hp brand is sh.40,000, one piece of Acer is sh.50,000 and one piece of Lenovo is sh.60,000. An import duty of 25% is imposed on each piece at the port of entry. Use matrix operation to find the after tax amount of money spent by each of the three merchants individually. [6 Marks]

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