**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.PLMY1 S1**

**TIME: 3 HOURS**

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

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**INSTRUCTIONS:**

- Answer Question ONE and Any Other THREE Questions.

**QUESTION ONE (40 MARKS)**

(a) Explain the significance of quantitative methods in management. [5 Marks]

(b) Solve the following system of linear equations

$x+y+z=6$
$x+2y+3z=14$
$-x+y-z\pm2$

[6 Marks]

(c) The table below reports data on prostate cancer death rates (per 100,000) and dietary fat consumption (g/day) for 12 countries. The data are shown in the Table below.

| 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 |
| 7 | 5.5 | 67 |
| 8 | 5.6 | 72 |
| 9 | 6.4 | 93 |
| 10 | 7.8 | 58 |

| | | |
|---|---|---|
| 11 | 8.4 | 95 |
| 12 | 8.8 | 67 |

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 shows statistics on treatment mode and response to treatment 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, 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? [3 Marks]
iii. Highlight four important characteristics of chi-square test. [4 Marks]

**QUESTION TWO**
(a) Discuss importance assumptions of the Linear programming model. [6 Marks]
(b) Explain the following concepts as used in hypothesis testing
(i) Level of significance [2 Marks]
(ii) A Parameter [2 Marks]

(c) A firm uses two machines in the manufacture of two products A and B. Each unit of product A requires 1 hour and 2 hours on machine 1 and II respectively. Each unit of product B requires 2 hours and 1 hour on machine 1 and II respectively. It is required that product A units should not exceed 320. The contribution margin on product A and B is Sh.6 and Sh.4 per unit respectively. The machine hours available on the two machines 1 and II are 720 and 780 respectively. Required:-
i. Formulate the above problem as a linear programming problem. [4 Marks]
ii. Develop the <u>first</u> simplex tableau for the problem [4 Marks]

**QUESTION THREE**

a) The daily demand function for a product is TR= $4x$. 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) Members of academic staff in eight universities were given a series of trainings on writing of fundable proposals. An evaluation was conducted to determine the effectiveness of training measured by average number of proposals submitted annually to the directorate of research. The average number of proposals submitted after the first and third training is given below:

| University No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Proposals submitted after 1st training | 50 | 42 | 51 | 26 | 35 | 42 | 60 | 41 |
| Proposals submitted after 3rd training | 62 | 40 | 61 | 35 | 30 | 52 | 68 | 51 |

Do the number of proposals submitted after the third training show an improvement? (Use paired t-test at 5% level of significance) [6 Marks]

**QUESTION FOUR**

a) Describe 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 MFIs that had adopted QMS services recorded 120, 150, 110, 160, 140, 140, and 160 customers per day. Another group of five MFIs which had not adopted the technology registered 80, 100, 140, 100 and 130 customers per day. Test at 5 per cent level whether there is significant evidence that introduction of QMS had increased the number of customers served per day. [6 Marks]

**QUESTION FIVE**

(a) Highlight the significance of regression analysis. [4 Marks]
(b) A researcher believes that job training quality of work environment and employee compensation scheme have great influence on employee productivity. In one of the recently

published articles in a journal of Human Resource Management, the following regression results were reported.

| | | | | |
|---|---|---|---|---|
| Emp.$\widehat{\prod}$.= | .284 – | 0.092 Training + | 0.0041 Work Envir. + | 0.022 Comp. |
| 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 job compensation 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 employee productivity. [2 Marks]

(c) Ambani, Kimathi and Mutiso purchased rice from two supermarkets P and Q. Ambani purchased 1000kg from P and 700kg from Q. Kimathi purchased 500kg from P and 600kg from Q. Mutiso purchased 400kg from P and 800kg from Q. If Ambani, Kimathi and Mutiso individually spent a total of Ksh.75,000, 50,000, 50,000 and 56,000 respectively, use matrix model to determine the cost of one kg of rice in P and Q. [6 Marks]

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