MURANGA UNIVERSITY COLLEGE

(A constituent College of Jomo Kenyatta University of Agriculture & Technology)

MAIN CAMPUS

SPECIAL UNIVERSITY EXAMINATIONS

2015/2016 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF PURCHASING AND SUPPLIES MANAGEMENT

COURSE CODE: HPS2210

COURSE TITLE: QUANTITATIVE METHODS 2

DATE: **TIME:** 2HOURS

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is Compulsory
Answer ANY OTHER TWO (2) questions

MRUC observes ZERO tolerance to examination irregularities

This Paper Consists of 2 Printed Pages. Please Turn Over.

QUESTION ONE (30kms)

(a) Define the following matrices.

(i) Scalar matrix (2mks).

(ii) Transposed matrix (2mks).

(iii) Column matrix. (2mks).

(b) The odds that A speaks the truth are 3: 2 and the odds that B speaks the truth are 5:3. What is the probability that they are likely to contradict each other on an identical point? (5mks).

(c) The mean length of life at a certain cutting tool is 41.5 hours with a standard deviation of 2.5 hours. What is the probability that a simple random sample of size 50 drawn from this population will have a mean between 40.5 hours and 42 hours? (4mks).

(d) Newspapers in Nigeria are complaining that rising level of unemployment is affecting the level of crime in the country. To study this claim, a research team studied a random sample of 12 states in the country. For each state, they measured the level of unemployment rate and the crime rate in the state. Then they did ranking. X represent the level of unemployment and Y, the crime rate, higher X ranks means more unemployment and higher Y ranks means high crime rate. The results are shown in the following table.

States	1	2	3	4	5	6	7	8	9	10	11	12
Level of Unemployment	5	8	3	2	6	1	10	12	7	4	9	11
Crime rate	8	6	9	12	7	10	2	1	5	11	4	3

Test the claim of the newspapers. (5mks)

(e) In a brand-switching situation, the transition probability matrix is given by:

$$\begin{bmatrix} 0.5 & 0.4 & 0.1 \\ 0.2 & 0.7 & 0.1 \\ 0.1 & 0.2 & 0.7 \end{bmatrix}$$

Find the percentage of market shares of the three companies at steady state. (6mks).

(f) If

$$\mathbf{A} = \begin{bmatrix} 1 & 2 \\ 3 & 0 \\ 4 & 1 \end{bmatrix} \text{ and } \mathbf{B} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 2 & 1 \\ 2 & 3 & 0 \end{bmatrix}$$

Find **BA**. (4mks)

QUESTION TWO (20mks)

(a) Mention four requirements for input-output requirements. (4mks)

(b) Solve the following simultaneous linear equations using Cramer's rule. (6mks).

$3x + y - z = 5$

$x + 4y + 2z = 6$

$2x + 3y + z = 4$

(c) Obtain the regression equations from the data given below. (10mks).

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	11	13	14	16	15

QUESTION THREE (20mks)

(a) Mention five merits of sampling method. (5mks).

(b) A trader bought 200 bags of sugar and 300 bags of rice for a total of Sh. 850,000 from Kongowea market. He also bought 90 bags of sugar and 120 bags of rice for a total of Sh. 360,000 from Majengo market.

Using the matrix

$$\mathbf{Q} = \begin{bmatrix} 2 & 3 \\ 3 & 4 \end{bmatrix}$$

Determine the prices of a bag of sugar and a bag of rice in the two markets. (5mks).

(c) A manufacturing company uses three machines in its production process namely; Machine A, Machine B and Machine C. The daily production of machines A, B and C is 12,000 units, 10,000 units and 18,000 units respectively. Past experience shows that the percentage of defective output produced by machines A, B and C is 1.5%, 1.8% and 3% respectively. An item is drawn at random from the daily production run and is found to be defective.

(i) Use a tree diagram to represent the above events. (4mks).

Find;

(ii) The probability that the defective item was from machine A. (2mks).

(iii) The probability that the defective item was from machine B. (2mks).

(iv) The probability that the defective item was from machine C. (2mks).

QUESTION FOUR

(a) Find the correlation co-efficient between the sales and expenses from the date given below. (10mks)

Firm	1	2	3	4	5	6	7	8	9	10
Sales (Millions sh.)	50	50	55	60	55	65	65	60	60	50
Expenses (Millions sh).	11	13	14	16	16	15	15	14	13	13

(b) Given below are the figures of production of a sugar factory.

Year	2009	2010	2011	2012	2013	2014	2015
Production in million tonnes.	40	45	46	42	47	49	46

Fix a straight line trend by the method of least squares and estimate the value for 2019. (10mks).