



TECHNICAL UNIVERSITY OF MOMBASA
Faculty of Applied & Health
Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS
CERTIFICATE (UPGRADING MATHEMATICS)

AMA 1104: COMMERCIAL ARITHMETIC & STATISTICS

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2013
TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A & B**

Answer question **ONE (COMPULSORY)** and any other **TWO** questions
 Maximum marks for each part of a question are as shown
 This paper consists of **FOUR** printed pages
SECTION A (COMPULSORY)

Question One

a) Given:

$$\underset{\sim}{B} = \begin{bmatrix} 5 & -10 \\ -4 & 8 \end{bmatrix}, \underset{\sim}{B} = \begin{bmatrix} -4 & 10 \\ -7 & 5 \end{bmatrix} \quad \text{and} \quad \underset{\sim}{C} = \begin{bmatrix} 8 & 26 \\ -14 & -6 \end{bmatrix}$$

Find $3\underset{\sim}{A} + 2\underset{\sim}{B} - \frac{1}{2}\underset{\sim}{C}$ **(5 marks)**

b) The data below shows the distribution of weights of fish harvested from a certain fish pond.

Weight (kg)	2 – 4	5 – 7	8 – 10	11 – 13	14 – 15
No. of Fish	3	8	12	10	2

- (i) Find the mean age **(3 marks)**
- (ii) Find the standard deviation of the age **(6 marks)**

c) A batch of 40 electric bulbs imported from China contains 5 that are defective. If a bulb is drawn at random from the batch and tested and then a second bulb is drawn at random, calculate the probability of getting one defective bulb.

- (i) With replacement **(2 marks)**
- (ii) Without replacement **(2 marks)**

d) (i) On the same axes sketch and clearly show the following regions:
 $y > x + 1$ $y \leq x + 3$

(5 marks)

(ii) A furniture manufacturer wishes to maximize profit. Information about available resources and constraints are shown below:

Resources	Table (X_1)	Chain (X_2)	Available

Maximize the profit **(7 marks)**

SECTION B (Answer any TWO questions from this section)

Question Two

The following measurements represent diameters of 50 bearings:

Diameter	Frequency
3.45 – 3.47	2
3.48 – 3.50	6

3.51 - 3.53	12
3.54 - 3.56	14
3.57 - 3.59	10
3.60 - 3.62	5
3.63 - 3.65	1

- a) Draw a cumulative frequency curve for the data (3 marks)
- b) Determine the following for the data
- (i) The mean (6 marks)
 - (ii) The standard deviation (6 marks)
 - (iii) The median (correct to 4 s.f) (3 marks)
 - (iv) The mode (2 marks)

Question Three

- a) (i) Convert the following matrix to row-echelon form:

$$A = \begin{bmatrix} -2 & 1 & -1 & 4 \\ 1 & 2 & 3 & 13 \\ 3 & 0 & 1 & -1 \end{bmatrix}$$

(5 marks)

- (ii) Solve the following system of equations using your answer in a(i)

$$-2x + y - z = 4$$

$$x + 2y + 3z = 13$$

$$3x + z = -1$$

(5 marks)

- b) solve the following system of equations by using the inverse matrix method of cofactors:

$$3x + y = 6$$

$$-x + 2y + 2z = -7$$

$$5x - z = 10$$

(10 marks)

Question Four

- a) A Kenyan bank buys and sells foreign currencies as shown below:

	Buying	Selling
	Kshs	Kshs
1 Euro	105.4	106.8
100 Japanese Yen	95.5	96.0

A Japanese travelling from Italy arrives in Kenya with 6000 Euros. He converts all the 6000 Euros to kshs at the bank. While in Kenya he spends a total of ksh 200 000 and then converts the remaining Kenya shillings to Japanese Yen at the bank. Calculate the amount in Japanese Yen which he receives.
(4 marks)

- b) Khamis bought a rental house for kshs 2.8 million four years ago. Real records show that estate property has been appreciating steadily at 10% p.a. in Kenya.
- (i) Find the value of the house currently. (3 marks)
 - (ii) determine how long he would have to wait to sell the house for kshs (3 marks)
- c) The price of a car in a dealers shop is kshs 1.1 million. If Salim buys the car at 10% discount and the dealer still makes a 105 profit, calculate the amount of money that the dealer paid for the car.
(5 marks)
- d) The probability that Naomi passes her Calculus exam is $\frac{3}{5}$ and that of her passing in Algebra is $\frac{2}{3}$. Calculate the following probabilities.
- (i) passes both Calculus and Algebra
 - (ii) passes only Calculus
 - (iii) passes only Algebra
 - (iv) passes either Algebra or Calculus (5 marks)

Question Five

- a) A building construction company needs to hire at least 10 skilled and 20 unskilled workers. It must employ less than 35 workers in total:
- (i) form 3 inequalities representing the conditions (3 marks)
 - (ii) graph the inequalities in a(i) (4 marks)
 - (iii) if the cost of one unskilled worker is kshs 400 per day while that of a skilled worker is kshs 1000 per day, how can the company hire the workers so as to minimize cost. (6 marks)
- b) A box contains 14 oranges 28 mangoes and 58 lemons all selected to be of the same size. Three fruits are drawn at random from the box in turn:
determine the probability of getting one orange, one mango, one lemon:
- (i) with replacement (2 marks)
 - (ii) without replacement (8 marks)