



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

UPGRADING MATHEMATICS

AMA 1104: COMMERCIAL ARITHMETICS & STATISTICS

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: MAY/JUNE 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions

Answer question **ONE (COMPULSORY)** and any **TWO** questions

Maximum marks for each part of a question are clearly shown

This paper consists of **FOUR** printed pages

SECTION A (COMPULSORY)

Question 1

- a) A car has initial value of kshs. 3 million when Prof. Njoroge buys it. A student plans to buy the car when its worth 1 million. If the rate of depreciation is 14% P.A after how many complete years will the Prof sell the car to the student? (4 marks)
- b) The ages of children who attended early child hood education in a certain school are shown below.

Age bracket in years	2 - 4	5 - 7	8 - 10	11 - 13	14 - 15
Number of children	3	8	12	10	2

- (i) Find the mean age (3 marks)
- (ii) Find the standard deviation of their ages (5 marks)
- c) A farmer raises chicks of two colours, black and white the probability of hatching a white chick is $\frac{3}{5}$ and hatching a black one is $\frac{2}{5}$. Brenda bought 2 chicks picked randomly from the farmer. What is the probability that:
- (i) They are both black (3 marks)
- (ii) They are of different colours (3 marks)
- d) A mixed school can accommodate a maximum of 440 students. The number of girls must at least be 120 while the number of boys must exceed 150. Taking x to represent the number of boys and y the number of girls, write down all inequalities representing this information (4 marks)
- e) Using Cramer's rule, solve for x and y (8 marks)
- $$x + y = 3$$
- $$x + 3y = 5$$

SECTION B (Answer any TWO questions from this section)

Question 2

- a) The table below shows the rates at which income tax is charged on annual income.

Taxable income per annum in (K£)	Rate in (Ksh/K£)
0 – 3600	2
3601 – 7200	3
7201 – 12000	4
12001 – 18000	5
Over 18000	6

Ekidor earns Kshs 15000 per month and he is housed by his employer. He pays a normal rent of kshs 300 per month and has a medical allowances of kshs 4000 per month. Ekidor is entitled to a personal relief of kshs 500 per month. Calculate his net tax per month. (10 marks)

b) Find the inverse of A given that

$$A = \begin{pmatrix} 3 & -2 & 1 \\ 5 & 6 & 2 \\ 1 & 0 & -3 \end{pmatrix}$$

(10 marks)

Question 3

a) A Kenyan Bank buys and sells foreign currencies as shown below.

	Buying (Kenyan Shilling)	Selling (Kenyan Shilling)
1 Euro	84.15	84.26
100 Japanese Yen	65.37	65.45

A Japanese travelling from France arrives in Kenya with 5000 Euros. He converts all the 5000 Euros to Kenya shillings at the bank. While in Kenya he spends a total of Kenya Shillings 189,850 and then converts the remaining Kenya Shillings to Japanese yen at the bank.

Calculate the amount Japanese Yen, which he receives

(5 marks)

b) The table below shows the ages in years of 60 people who attended a conference.

Age in years	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79
Number of people	10	12	18	17	3

Determine:

- (i) The median (2 marks)
- (ii) The interquartile range (6 marks)
- (iii) The mean (3 marks)

c) A box has 6 blue beads and 4 red beads. Three beads are drawn at random (without replacement).

- (i) Draw a tree diagram to represent this information (2 marks)
- (ii) What is the probability that all are blue (2 marks)

Question 4

a) Using Cramer's rule, solve for x, y, z

(11 marks)

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

$$x - y - z = 0$$

$$x + 2y + z = 0$$

- b) Musa bought a house for Kshs 250,000. If the house appreciates steadily over the years by 12% of its value at the beginning of each year, find the value of the house after 10 years (5 marks)
- c) The marked price of a car in a dealer's shop was kshs 400,000. Wekesa bought the car at 8% discount. The dealer still made a profit of 15%. Calculate the amount of money the dealer had paid for the car. (5 marks)

Question 5

- a) A company needs to employ at least 5 skilled and at least 10 unskilled women and it must employ less than 20 women in total.
- (i) Form three inequalities to describe the condition (3 marks)
 - (ii) Graph the inequalities in (i) above (4 marks)
 - (iii) If the cost of one skilled woman is shs 500 per day and one unskilled woman is shs 100 per day. How can the company employ the women so as to minimize its cost (6 marks)
- b) A basket holds 3 lemons and 7 tangerines. Njeri picked 2 fruits at random. What is the probability that:
- (i) Both were tangerines (2 marks)
 - (ii) There was one of each kind (2 marks)
 - (iii) There was at least one tangerine (3 marks)