



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

UPGRADING MATHEMATICS

AMA 1104: COMMERCIAL ARITHMETICS & STATISTICS

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY 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 **THREE** printed pages
SECTION A (COMPULSORY)

Question One (20 marks)

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

a) Find the inverse of (3 marks)

$$12x^2 + x - 6 = 0$$

b) Solve by factorization (4 marks)

$$1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8}$$

c) Find the sum to infinity given the series (4 marks)

d) Calculate the mean weight. (4 marks)

Mass (kg)	1.3 – 1.5	1.6 – 1.8	1.9 – 2.1	2.2 – 2.4	2.5 – 2.7
Number of Chicken	6	22	47	20	5

e) A man shares his property as follows $\frac{1}{3}$ to his wife, $\frac{1}{4}$ of the remainder to his son and the remainder is shared between his 4 daughters. If each daughter received sh. 30,000, what was the total amount left? (5 marks)

SECTION B (Answer any TWO questions from this section)

Question Two (20 marks)

a) Shs. 10000 is invested at 8% compounded quarterly. How much is in the account at the end of 2 years? (5 marks)

$$R = 200x + 50$$

b) A clothing firm estimates its total revenue R in shillings to be given by $R = 200x + 50$ from the sale of x suits. Determine the number of suits it must sell so that its total revenue exceeds sh. 70,050. (6 marks)

$$3x + 7y = 4$$

$$2x - 4y = 5$$

c) Solve $\begin{cases} 3x + 7y = 4 \\ 2x - 4y = 5 \end{cases}$ by a matrix method. (5 marks)

$$\frac{1}{3 - 2\sqrt{5}}$$

d) Rationalize $\frac{1}{3 - 2\sqrt{5}}$ (4 marks)

Question Three (20 marks)

a) Differentiate $y = x^3$ from the definition. (5 marks)

- b) A salesman receives a salary of ksh. 15,000 per month and a commission of $7\frac{1}{2}\%$ on all orders over ksh 30,000. How much will he earn in a month if he secured orders worth of 107, 600? **(5 marks)**
- c) The profit of a business is shared in proportion to the share capital. A has sh. 5,500 and B has sh. 4,000. If the profit is sh. 2,850, how much will each receive? **(5 marks)**
- d) Find the sum of the first 10 terms of the sequence.
2, -2, -6, -10 **(5 marks)**

Question Four (20 marks)

- a) If the number of employees in a factory decreases from 700 to 651,, what percentage decrease does this represent? **(4 marks)**

$$33\frac{1}{3}\%$$

- b) A man borrowed sh. 12,000 from a microfinance organization. A deposit of $12\frac{1}{2}\%$ was required and interest at $33\frac{1}{3}\%$ was charged on the outstanding balance for the period of repayment. The balance plus interest is paid in 24 monthly installments. How much is each instalment?**(10 marks)**

- c) If $A = \begin{pmatrix} 4 & 5 \\ 7 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 7 & 8 \\ 5 & -4 \end{pmatrix}$ find $-3A + 4B$ **(6 marks)**

Question Five (20 marks)

- a) Expand $(3x - 4y)^5$ **(3 marks)**
- b) In a group of 20 people, 8 are men, 6 women, 4 boys and 2 girls. A person is chosen at random. Find the probability that:
(i) The person is female **(3 marks)**
(ii) The person is either a man, a woman or a girl **(3 marks)**
- c) If shs. 6,000 is borrowed on 4th march at 8% p.a. single interest and repaid on 16th May, how much interest is paid? **(4 marks)**
- d) Allan’s salary is sh 16,510 per month. He was entitled to a monthly tax relief of ksh 960. Use the tax table below to calculate:
(i) Annual salary **(3 marks)**
(ii) Monthly tax in kshs **(4 marks)**

Income K£ per annum	Tax Rates sh. Per £
1 – 4512	2
4513 – 9024	3
9025 – 13536	4

13537 – 18048	5
18049 – 22560	6
Over 22560	6.5