THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

UPGRADING MATHEMATICS

AMA 1104: COMMERCIAL ARITHMETIC AND STATISTICS

FINAL EXAMINATION

SERIES: AUGUST/SEPTEMBER 2011

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 other two questions
Calculators may be used
This paper consist of **FOUR** printed pages

Question One

a) Hassan makes two types of shoes: A and B. He takes 3 hours to make one pair of type A and 4 hours to make one pair of type B. He works for a maximum of 120 hours to make x pairs of type A and y pairs of type B. It cost him ksh. 400 to make a pair of type A and kshs. 150 to make a pair of type B. His total cost does not exceed kshs. 9,000. He must make 8 pairs of type A and more than 12 pairs of type B.

   i)   Write down four inequalities representing the information above   (4 marks)

   ii)   Draw the inequalities and shade the unwanted regions   (6 marks)

   iii) Hassan makes a profit of ksh 40 on each pair of type A and ksh 70 on each pair of type B shoes. Determine the maximum profit.   (2 marks)

b) Determine the inverse of the Matrix A

$$A = \begin{pmatrix} 2 & 3 \\ 2 & 4 \end{pmatrix}$$

   And hence solve:

   $$2x + 3y = 4$$

   $$2x + 4y = 1$$

                                                                                 (8 marks)

c) Asali bought a plot at Miritini at ksh.150,000/=, five years ago. Today the plot is worth ksh. 500,000/=. Calculate the rate of appreciation.   (4 marks)

d) Represent the following population of five of the Eastern African countries on a pie chart.

Kenya	35,000,000
Tanzania	40,000,000
Uganda	15,000,000
Rwanda	7,000,000
Burundi	3,000,000

                                                                                 (6 marks)

Question Two

a) (i) Determine the region represented by the following inequalities and name the polygon formed.   (8 marks)

(i)

$$y \geq 0$$
$$2y \geq x+2$$
$$y =\leq 2x+2$$
$$y+2 \leq 2$$
$$2y+x \leq 2$$

   (ii)   Maximize   (2 marks)

$$3y - x$$

b) A bag contains 8 green ball and 7 red balls. A ball is drawn three times.
   (i)   Calculate the probability of drawing three red balls if the ball is not replaced.
                                                            (2 marks)
   (ii)   Calculate the probability of drawing at least two red balls when the ball is not
          replaced.   (8 marks)

Question Three

The number of chicken cooked in one day in a particular butchery was recorded on 30 occasions.

66	87	79	74	84	72	81	78	68	74
80	71	91	62	77	86	87	72	80	77
76	83	75	71	83	67	94	64	82	78

a) Find the range of the data

b) (i) Using an appropriate method, group the data and plot a cumulative frequency curve.
                                                                 (8 marks)
   (ii)   Using the frequency curve find:-

a) The median   (2 marks)
b) The interquartile range   (2 marks)
c) The 70th percentile   (2 marks)

Question Four

a) Solve the following simultaneous equation using Cramer's law. (8 marks)
$$2x+3y+z = 4$$
$$3x+2y+2z =13$$
$$5x+4y-3z =-5$$

b) Suswa who is entitled to personal relief of ksh. 1,160 per month finds that his PAYE is ksh.25,400 per month . He is also deducted WCPS ksh. 500 per month and retirement ksh. 1,200 per month. Use the table below to calculate Suswas's Net salary per month.

(12 marks)

Taxable income in K£ p.a.	Rate %
1 – 5000	10
5001 – 10000	15
10001 – 20000	20
Over 20000	25

Question Five

a) Mohammed buys a new matatu on hire purchase scheme as follows. The cash price of the vehicle is 0.9 million of which he pays 60% as deposit. The remaining is financed over a period of 4 years at interest rate of 18% per year.

Calculate;

i)	The down payment	(2 marks)
ii)	Total interest for the four years	(6 marks)
iii)	Monthly installment	(4 marks)
iv)	Percentage loss over the cash price deal	(3 marks)

$$A = \begin{pmatrix} 0 & 1 \\ 1 & 2 \end{pmatrix} \qquad B = \begin{pmatrix} 1 & -1 \\ 0 & 2 \end{pmatrix}$$

b) Given ⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀and

$$C = (A+B)^2 - (A^2 + AB + B^2)$$

Find matrix C such that ⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀(5 marks)