TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEATH SCIENCES

MATHEMATICS DEPARTMENT

UNIVERSITY EXAMINATION FOR:

UPGRADING IN MATHEMATICS

AMA 1004: COMMERCIAL ARITHMETICS AND STATISTICS.

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: TWO HOURS

DATE: may 2016

<u>**Instructions to Candidates**</u>
You should have the following for this examination
-Answer Booklet, examination pass and student ID
This paper consists of FIVE questions. Attempt Question **ONE** and any other TWO.
Do not write on the question paper.

Question ONE

(a) The height in centimeters of 100 tree seedlings are shown in the table below.

Height (cm)	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69
Number of seedlings	9	16	19	26	20	10

Find the quartile deviation of heights   (4 mks)

(b) A customer paid ksh. 5, 800 for a suit after she was allowed a discount of 2 % on the selling price. If the

discount had not been allowed, the shopkeeper would have made a profit of 20% on the sale of the suit.
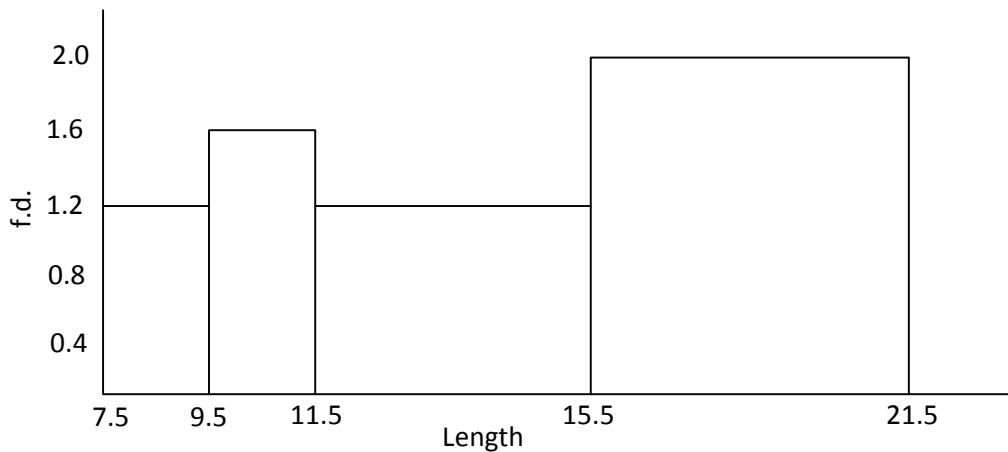
Calculate the price at which the shopkeeper bought the suit   (3 mks)

(c) A bag contains 3 black balls and 5 white ones. If two balls are picked from the bag one at

a time, calculate the probability of drawing a black ball and a white ball in any order.

(i) 2 balls of different colours.   (2 marks)

(ii) 2 white balls.   (2 marks)

(d) The figure **below** shows a histogram

Use the histogram to complete the table **below**.

Length χcm	Class width	Frequency density	Frequency
$7.5 \leq \times < 9.5$		1.2	24
$9.5 \leq \times < 11.5$			
$11.5 \leq \times < 15.5$			
$15.5 \leq \times < 21.5$			

(4 marks)

(e) A tourist arrived in Kenya with sterling pound (£) 4680 all of which he exchanged into Kenyan money. He spent Ksh. 51,790 while in Kenya and converted the rest of the money into U.S dollars. Calculate the amount he received in U.S dollars. The exchange rates were as follows.

	Buying	**Selling.**
US $	95.20	99.10
Sterling Pound (£)	123.40	131.80

(4 mks)

(f) Find all the integral values of χ which satisfy the inequalities. (4mks)

$$x + 8 > 4x - 6 \geq 3(4 - x)$$

(g) Determine the inverse T^{-1} of the matrix $T = \begin{pmatrix} 1 & 2 \\ 1 & -1 \end{pmatrix}$ hence solve the equation:

$$x + 2y = 7$$
$$x - y = 1$$

(3 marks)

(h) The probability that a day is rainy is ¼. The probability that a teacher carries an umbrella on a rainy day is $^1/_7$ and that he carries an umbrella on a non-rainy day is $^2/_7$. Find the probability that a teacher carries an umbrella. (4mks)

Question TWO

(i)   The masses of 40 babies born in a clinic were recorded as shown in the table below

Mass Kg	2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9	4.0-4.4
No. of babies	5	13	14	6	2

Calculate

a) the mean mass using an assumed mean of 2.7 Kg   (4 mks)

b) the median mass   (4 mks)

c) If 18 % of them were born underweight, determine how many children were the correct

weight at birth.   (2 mks)

(ii)   A man invests Ksh.24, 000 in an account which pays 16% interest p.a. the interest is compounded
       quarterly. Find the amount in the account after 1½ years.
       (3mks)

(iii) Use Cramer's Rule to solve for the unknowns in three linear equations: (5mks)

$$5x_1 - 2x_2 + 3x_3 = 16$$

$$2x_1 + 3x_2 - 5x_3 = 2$$

$$4x_1 - 5x_2 + 6x_3 = 7$$

(iv)   Differentiate between continuous and discrete data   (2mks)

Question THREE

(a) The table below shows the tax levied at different rates for different levels of income.

Monthly taxable pay (sh)   Rate of tax

1 – 9680   10%

9681 – 18800   15%

18801 – 27920	20%
27921 – 37040	25%
Over 37040	30%

Relief: Every tax payer receives a tax relief of sh. 1096 per month.

Maggy has a monthly salary of sh. 26,000. She is provided with a house at a nominal rent of sh. 800 per month. The value of the house is calculated as 15% of her salary, less the rent.

(i) Find her taxable income. (2 marks

(ii) Find the amount of tax she pays. (4 marks

(b) A man invests Ksh. 10,000 in an account which pays 16% interest p.a. The interest is compounded quarterly. Find the amount in the account after 1 ½ years. (4 marks)

(c) In a dark room, there are 2 pairs of blue stockings and 3 pairs of yellow stockings. If John walks into the room and picks two pair of socks, one at a time, what is the probability that picks socks of different colours? (3 mks)

(d) Find the integral values of y which satisfy the inequalities.

$$4y – 3 \leq \frac{1}{2}(y + 8) < y + 6$$ (3 marks)

Question FOUR

(a) . Two baskets X and Y contain identical balls except for the colours. Basket X contains 6 red balls and 3 black balls. Basket Y contains 2 red balls and 3 black balls.

(a) If a ball is drawn at random from each basket, find the probability that both balls

are of the same colour. (4 marks)

(b) If two balls are drawn at random from each basket, one ball at a time without replacement, find the probability that:-

(i) The two balls drawn from basket X or basket Y are red. (4 marks)

(ii) All the four balls drawn are red. (2 marks)

(b) The table below shows the number of goals scored in 40 soccer matches during a certain season.

No. of goals	0	1	2	3	4	5	6	7
No. of matches	3	9	6	8	5	5	2	1

Calculate the mean number of goals scored per match. (3mks)

(c) James is a sales executive earning a salary of Ksh. 90,000 and a commission of 9% for the sales in excess of sh. 1,000,000. If in May he earned a total of Ksh. 450,000 in salaries and commission. Determine the amount of sales he made in that month. (4 marks)

(d) A fridge was bought on hire purchase terms. A down payment of sh. 6,000 was required

and 12 monthly instalments of sh. 1500 each. Calculate its cash price to the nearest ten

if it was 18% higher than the hire purchase price. (3 marks)

Question FIVE

(a)   A shoe maker 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 costs him Kshs. 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.9000. He must make

at least 8 pairs of type **A** and **at most 12** pairs of type **B**.

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

(ii) On the grid provided represent the inequalities and shade the unwanted regions (4mks)

 (iii) The shoe maker makes a profit of kshs.40 on each pair of type **A** and kshs.70 on each pair (2mks)

(b) The probability of John coming late to school on Monday is 0.6 and that of Asha is 0.7.

If John comes late, the probability of him being punished is 0.5 and that of Asha being

punished if she comes late is 0.2. Determine the probability that:-

(i) Both will be punished. (2 marks)

(ii) Only one will be punished. (3 marks)

(c) Solve the following equation and find the value of x, y, z.   (5mks)
$3x + y + z = 3$
$2x + 2y + 5z = -1$
$x - 3y - 4z = 2$