



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

MATHEMATICS DEPARTMENT

UNIVERSITY EXAMINATION FOR:

UPGRADING IN MATHEMATICS PPI

AMA 1004: COMMERCIAL ARITHMETICS AND STATISTICS.

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

TIME: TWO HOURS

DATE: DECEMBER 2016

Instructions to Candidates

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) A Canadian tourist came to Kenya with sterling pounds 5000 which he exchanged to Kenyan shillings. He spent three quarters of the money and exchanged the rest to sterling pounds on leaving. How much to the nearest pound did he receive given the exchange rate? (4mks)

Buying	selling
119.72	119.86

- b) A salesman earns a basic salary of Kshs. 19,000 per month. In addition, he earns a commission of 5% for all sales above Ks. 20,000. In February 2011, he sold goods worth 115,000.

Calculate his total earnings that month. (3 marks)

c) A basket ball team play 10 matches in a tournament. The following are scores in each match.

9, 15, 17, 16, 7, 20, 21, 15, 10, 12

Determine:

(a) the mode. (1 mark)

(b) the median. (2 marks)

d) The probability that a day is rainy is $\frac{1}{4}$. The probability that a teacher carries an umbrella on a rainy day is $\frac{1}{7}$ and that he carries an umbrella on a non-rainy day is $\frac{2}{7}$. Find the probability that a teacher carries an umbrella. (3mks)

e) A man invests Ksh 10000 in an account which pays 16% interest p.a. The interest is compounded quarterly. Find the interest earned after 1 $\frac{1}{2}$ years to the nearest shilling. (4mks)

f) Find the quartile deviation for the data below 235, 418, 626, 405, 335, 717, 504, 609, 414, 431, 918. (3mks)

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

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

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

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

h) State all the integral values of x that satisfy the following inequality. (4mks)

$$2x-3 \leq 3x+5 \leq 7x+6$$

i) A wholesaler sold a cell phone to a retailer making a profit of 20%. The retailer later sold the cell phone for Ksh.3120 making a profit of 30% calculate the amount of money the wholesaler had paid for the cell phone. (3 marks)

Question TWO

(a) The table below shows the marks scored by 40 students in a test.

Marks	10 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 - 49
Frequently	3	4	7	10	9	7

(i) Calculate the mean mark. (3 marks)

(ii) Calculate the median mark. (3 marks)

(iii) Calculate the standard deviation.

(4 marks)

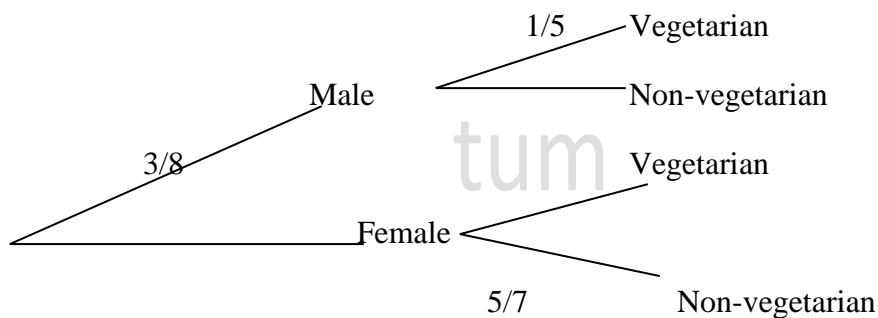
b) Wambua invested Sh. 6400 at 15% per annum compound interest for 3 years. Muinde invested twice that amount at $12\frac{1}{2}\%$ per annum simple interest for the same period of time. Find whose investment earned more interest and by how much. (4 Marks)

c) Find the value of x given that $\begin{pmatrix} 2x - 1 & 1 \\ x^2 & 1 \end{pmatrix}$ is a singular matrix. (3mks)

d) A car valued at Ksh.500,000 in January 2008. Each year, it value depreciates at 12%p.a. Find after how long would the value depreciate to Ksh.250,000(3 marks)

Question THREE

a) A survey was conducted on 160 students to determine their eating preferences; some of the probabilities calculated from the results are shown in the tree diagram below:



- a) Copy and complete the tree diagram. (2mks)
- b) How many of the students in the survey were female. (2mks)
- c) One of the students is selected at random .Find the probability that the student selected.
- i) A female vegetarian. (2mks)
 - ii) A vegetarian. (2mks)
 - iii) A non-vegetarian. (2mks)
- d) A trader bought 8 cows and 12 goats for a total of Ksh.294,000. If he had bought 1 more cows and 3 more goats he would have spend Ksh.337,500.
- (i) Form two equations to represent the above information. (2 marks)
 - (ii) Use matrix method to determine the cost of a cow and that of a goat. (4 marks)
- e) The trader sold the animals he had bought making a profit of 40% per cow and 45% per goat.
- (i) Calculate the total amount of money he received. (2 marks)
 - (ii) Determine his profit in Kenya shillings. (2 marks)

Question FOUR

(a) Kamene has 20 acres of land. She intends to grow maize and beans. She requires sh. 2,000 to plant an acre of maize and sh. 4,000 for an acre of beans. Twice the area to be planted with maize should not be less than the one of beans. The total capital available is sh. 60,000. The estimated profit is sh. 5,000 for an acre of maize and sh. 7,000 for an acre of beans. By letting x and y to represent the area to be planted with maize and beans respectively.

(i) Find the inequalities to represent the above information. (4 marks)

(ii) On the square grid provided, graph the above inequalities and show the region which satisfy them simultaneously. (Use the scale 3cm rep. 5 units on both axes.) (4 marks)

(iii) Determine the expected maximum profit. (2 marks)

(b) Solve the inequalities $x \leq 2x + 7 \leq -\frac{1}{3}x + 14$ hence represent the solution on a number line.

(4mks)

(c) Use the inverse matrix method rule to solve simultaneous equations.

$$2x + y = 10$$

(3mks)

$$2x + 2y = 14$$

(d) Determine the quartile deviation of the set of numbers below. (3mks)

8, 2, 3, 7, 5, 11, 2, 6, 9, 4

Question FIVE

(a) Mwaniki, Kamau and Kitheka started a joint Venture by contributing sh. 240,000, sh. 270,000 and sh. 300,000 respectively. They agreed that 30% of the profit made at the end of each year will be ploughed back into the business. They also agreed that 40% of the profits will cover salaries and other expenses for that year. The remainder was to be shared among the three partners in the ratio of their contributions. At the end of the first year, the business realized a gross profit of sh. 180,000.

Calculate how much each received at the end of the year. (5 marks)

b) Hellen's earnings are as follows:

Basic salary sh. 38000 per month

House allowance sh. 14000 per months

Travelling allowance sh.8500 per month and

Medical allowance Ksh.3300 per month.

She is given a personal relief of Ksh. 12672

The table for payable tax is shown below

Income in Ksh p.a	Payable tax %
0-120000	10
120001-240000	15
240001-360000	20
360001- 480000	25
480001- 600000	30
600001-720000	35
720001-840000	40
840001-960000	45
Over 960000	50

Calculate

(a) (i) Hellen's taxable income in Ksh p.a (2mks)

(ii) Her P.A.Y.E (5mks)

(b) Hellen is deducted the following items per month

NHIF Ksh.320

Cooperative shares Ksh.2000

Loan repayment Ksh5000

Determine her net salary per month (3mks)

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

$$3x_1 + 4x_2 - 3x_3 = 5$$

$$3x_1 - 2x_2 + 4x_3 = 7$$

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

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