



CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 21 May 2019.

Time Allowed: 3 hours.

Answer any FIVE questions. ALL questions carry equal marks. Show ALL your workings.

QUESTION ONE

- (a) Highlight four measures of dispersion that could be used in descriptive statistics. (4 marks)
- (b) Summarise four applications of information communication technology (ICT) in statistics. (4 marks)
- (c) A student purchased 5 pencils and 4 pens at a cost of Sh.48. He also purchased 3 pencils and 7 pens at a cost of Sh.61.

**Required:**

The cost price of a pencil and a pen using the matrix method. (6 marks)

- (d) A businessman bought 10 trays of eggs at Sh.360 per tray. On transit, 90 eggs got broken. The businessman intends to sell the remaining eggs at a price that will enable him to earn a profit at a markup of 20% on all the eggs bought. Assume that one tray contains 30 eggs.

**Required:**

The selling price per egg. (6 marks)

(Total: 20 marks)

QUESTION TWO

- (a) Highlight four disadvantages of the interview method of collecting data. (4 marks)
- (b) The 8<sup>th</sup> term of an arithmetic series is 57 and the 17<sup>th</sup> term is 111.

**Required:**

- (i) The common difference. (2 marks)
- (ii) The first term of the series. (2 marks)
- (iii) The sum of the first 28 terms. (2 marks)
- (c) A certain country is divided into three regions namely; A, B and C which have a population of 600,000; 900,000 and 1,800,000 people respectively.

The country's national revenue is Sh.9,000,000 and is allocated to each region in proportion to its population size.

**Required:**

The revenue allocated to each of the three regions. (4 marks)

- (d) Given the following matrices;

$$A = \begin{pmatrix} 5 & 11 & 10 \\ 12 & 17 & 9 \end{pmatrix}$$

$$B = \begin{pmatrix} 6 & 4 & -5 \\ 3 & 2 & 8 \\ 1 & 0 & -3 \end{pmatrix}$$

$$C = \begin{pmatrix} -13 & 4 \\ 8 & 7 \\ 25 & 2 \end{pmatrix}$$

**Required:**

Evaluate  $AB + C^T$ , where  $C^T$  is the transpose of matrix C.

(6 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) List the four types of measurement scales.

(4 marks)

(b) Teddy Manduli spent his April 2019 salary as follows:

$\frac{1}{3}$  on food.

$\frac{1}{6}$  on house rent.

$\frac{1}{7}$  on medical expenses.

$\frac{1}{4}$  on children's school fees.

The balance of Sh.3,000 was given to his wife.

**Required:**

(i) The amount of his April 2019 salary.

(4 marks)

(ii) The amount spent on each item.

(4 marks)

(c) The following data show the marks scored by 88 students in a Fundamentals of Business Mathematics test in a certain college:

Marks (%)	Number of students
20-30	7
30-40	9
40-50	14
50-60	22
60-70	18
70-80	12
80-90	<u>6</u>
	<u>88</u>

**Required:**

(i) The mean mark.

(2 marks)

(ii) The median mark.

(2 marks)

(iii) The standard deviation of the marks.

(4 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Solve the following simultaneous equations using the elimination method:

$$3x + 2y = -51$$

$$2x + 3y = -49$$

(4 marks)

- (b) An American tourist arrived in Kenya with 42,700 Euros, 3,800 Swiss Francs and 22,000 Indian Rupees.

The tourist converted all the money denominated in foreign currencies to Kenya Shillings and paid a bank charge of 2% of the total amount.

During his stay in Kenya, the tourist spent Ksh.6,120,560.

Upon returning to his country, the tourist changed the remaining cash to US Dollars and paid a bank charge of 3%.

**Exchange rates:**

1 Euro = Ksh.140

1 Swiss Franc = Ksh.90

1 Indian Rupee = Ksh.3.50

1 US Dollar = Ksh.99

**Required:**

The net amount of US Dollars that the tourist received upon returning to his country (6 marks)

- (c) Jane Kulumba earns Sh.320 per hour. She worked for a total of 280 hours in the month of April 2019. Out of the 280 hours, 40 hours were overtime being paid at the rate of Sh.400 per hour.

Income tax (PAYE) was calculated on her total income at the following rates:

First Sh.20,000 at 10%

Next Sh.20,000 at 15%

Next Sh.20,000 at 20%

Next Sh.20,000 at 25%

Excess of Sh.80,000 at 30%.

A personal relief of Sh.2,800 per month is provided. Other deductions from her total earnings were as follows:

National Social Security Fund (NSSF) – Sh.1,000

National Hospital Insurance Fund (NHIF) – Sh.1,600

Union dues – Sh.2,220

Contribution to SACCO – Sh.10,000

**Required:**

Net amount payable to Jane Kulumba at the end of April 2019. (10 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

- (a) The area under a curve is given by the function  $y = 3x^2 - 4x + 2$  when the values of  $x$  are given within the range  $-1 \leq x \leq 2$ .

**Required:**

The area enclosed by the curve in square units. (5 marks)

- (b) The probabilities of Jumwa, Kache and Kadzo hitting a target in a single attempt in a game are  $\frac{1}{4}$ ,  $\frac{1}{3}$  and  $\frac{1}{6}$  respectively.

**Required:**

Find the probability that:

- (i) Kadzo misses the target. (1 mark)
- (ii) All the three hit the target. (2 marks)
- (iii) All the three miss the target. (2 marks)
- (iv) At least one of them hits the target. (2 marks)

- (c) A trader purchased 5 goats and 9 cows at a total cost of Sh.155,000. He also purchased 6 goats and 7 cows at a total cost of Sh.129,000. He intends to make a 10% profit on cost on each goat and 15% profit on each cow.

**Required:**

- (i) Using the substitution method, find the cost price of one goat and one cow. (6 marks)
- (ii) The selling price of one goat and one cow. (2 marks)
- (Total: 20 marks)**

**QUESTION SIX**

- (a) Distinguish between the following terms as used in business mathematics:

- (i) "Simple interest" and "compound interest". (2 marks)
- (ii) "Appreciation" and "depreciation". (2 marks)
- (iii) "Markup" and "margin". (2 marks)

- (b) Integrate the function  $8x^3 - 3x^2 + 8x - 10$  with respect to  $x$ . (4 marks)

- (c) The following data show the performance of 56 students in a Fundamental ICT Skills examination:

Marks (%)	Number of students
30-40	6
40-50	8
50-60	17
60-70	10
70-80	9
80-90	4
90-100	2

**Required:**

- (i) A "less than" cumulative frequency curve. (6 marks)
- (ii) From the curve in (c) (i) above, estimate the median mark. (2 marks)
- (iii) The number of students who scored a mark of 60% or less. (2 marks)
- (Total: 20 marks)**

**QUESTION SEVEN**

- (a) Given that  $y = -x^3 + 4x^2 + 6x + 10$ , find the derivative of this function. (4 marks)

- (b) Jane Mbithe has been working in an audit firm for the last 10 years. She receives a fixed annual salary increment of 10% of her starting salary. Her starting annual salary was Sh.300,000.

**Required:**

The amount she will be earning in her 25<sup>th</sup> year of employment. (4 marks)

- (c) Use indices to find the value of the following unknowns:

- (i)  $2^{(x-2)} = 256$ . (2 marks)
- (ii)  $5^{2y} = 625$ . (2 marks)

- (d) David, Ann and Ken are in a partnership business. They contributed capital as follows: Sh.5,000,000, Sh.15,000,000 and Sh.5,000,000 for David, Ann and Ken respectively. They made a profit of Sh.10,000,000 in the year ended 31 March 2019.

**Required:**

- (i) If profit is shared on the basis of capital contributed, calculate the amount earned by David, Ann and Ken. (6 marks)
- (ii) Express the profit earned by David as a percentage of his capital contribution. (2 marks)
- (Total: 20 marks)**