CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 3 December 2024. Afternoon Paper. **Time Allowed: 3 hours.**

This paper consists of fifty (50) Multiple Choice Questions. Answer ALL questions by indicating the letter (A, B, C or D) that represents the correct answer. Each question is allocated two (2) marks. Do NOT write anything on this paper.

1. Round off the number 123,456 to three significant figures.
   A. 123,400
   B. 123,500
   C. 123,000
   D. 123,460 (2 marks)

Use the data below to answer Question 2 to Question 5.

A contingency table below shows the number of customers who prefer different types of products:

	Product A	Product B
Likes	50	30
Dislikes	20	130

2. What is the probability that a customer dislikes product A?
   A. 0.087
   B. 0.286
   C. 0.304
   D. 0.133 (2 marks)

3. If a customer prefers product B, what is the probability that they like product B?
   A. 0.375
   B. 0.870
   C. 0.1875
   D. 0.130 (2 marks)

4. What is the probability that a customer dislikes product A, given that they dislike a product?
   A. 0.286
   B. 0.652
   C. 0.304
   D. 0.133 (2 marks)

5. What is the probability that a customer prefers product B or likes a product?
   A. 0.696
   B. 0.348
   C. 0.913
   D. 0.087 (2 marks)

6. Which statistical measure of central tendency is most affected by outliers?
   A. mean
   B. median
   C. mode
   D. standard deviation (2 marks)

Use the data below to answer Question 7 to Question 11.

If the class intervals for a grouped data are 10 – 20, 20 – 30 and 30 – 40 and the frequencies are 5, 10 and 15 respectively.

7. Determine the mean.
   A. 25
   B. 10
   C. 28.33
   D. 30.67 (2 marks)

8. Determine the median.
   A. 15
   B. 20
   C. 25
   D. 30 (2 marks)

9. Determine the mode.
   A. 40
   B. 30
   C. 15
   D. 10 (2 marks)

10. Determine the variance.
   A. 55.556
   B. 858.333
   C. 802.777
   D. 28.333 (2 marks)

11. Determine the standard deviation.
   A. 29.297
   B. 7.454
   C. 28.333
   D. 5.323 (2 marks)

12. Which one of the following statements is an example of a systematic sampling method?
   A. Choosing every 10^{th} person from a list of employees
   B. Dividing the population into sub-groups and randomly selecting individuals from each group
   C. Asking friends to volunteer for a survey
   D. Randomly selecting individuals from the entire population (2 marks)

13. Which one of the following sampling methods would you use if you want to ensure that certain subgroups are represented proportionately?
   A. Cluster sampling
   B. Simple random sampling
   C. Stratified sampling
   D. Convenience sampling (2 marks)

14. What is the primary benefit of using cluster sampling?
   A. It eliminates the need for random selection
   B. It reduces costs by sampling from naturally occurring groups
   C. It ensures that every sub-group is represented proportionately
   D. It provides more accurate results than random sampling (2 marks)

15. Which one of the following collection methods involves systematically recording behaviours as they occur naturally?
    A. Survey
    B. Observation
    C. Experiment
    D. Focus group discussions (2 marks)

16. You are travelling to Australia and the exchange rate is 1 AUD = 0.75 USD. If you need 1,500 Australian dollars, how many US dollars will you need?
    A. 1,100 USD
    B. 2,000 USD
    C. 1,125 USD
    D. 1,250 USD (2 marks)

17. How much interest is earned on a Sh.7,000 investment over 5 years at an annual simple interest rate of 4.5%.
    A. Sh.8,575
    B. Sh.1,723.27
    C. Sh.1,575
    D. Sh.315 (2 marks)

18. A sum of Sh.5,000,000 is invested for 4 years at an interest rate of 8% compounded quarterly. What is the future value of the investment?
    A. Sh.6,863,928.53
    B. Sh.6,802,440.53
    C. Sh.5,412,160.53
    D. Sh.6,600,000.53 (2 marks)

19. A retailer purchases a product for Sh.1,200 and sets a margin based on selling price at 25%. What is the selling price of the product?
    A. Sh.1,500
    B. Sh.1,225
    C. Sh.1,600
    D. Sh.1,440 (2 marks)

20. If a product is sold at Sh.8,000 with a 30% mark-up on the cost price, what is the cost price?
    A. Sh.6,153.85
    B. Sh.10,400
    C. Sh.5,600
    D. Sh.3,428.57 (2 marks)

21. If the cost price of a product is Sh.1,680. What mark-up percentage will give a selling price of Sh.2,800?
    A. 40%
    B. 66⅔%
    C. 66⅓%
    D. 60% (2 marks)

Use the information provided below to answer Question 22 to Questions 24.

James Itumbi earns Sh.50,000 per month. Income tax (PAYE) was calculated on his total income at the following rates:

- Up to Sh.24,000 : 10%
- Sh.24,001 to Sh.32,333 : 25%
- Above Sh.32,333 : 30%

A personal relief of Sh.2,400 is provided.

22. Determine James's gross P.A.Y.E in a month.
    A. Sh.15,000
    B. Sh.7,383.35
    C. Sh.12,600
    D. Sh.9,783.35 (2 marks)

23. Determine James Itumbi's net P.A.Y.E in a month.
A. Sh.7,383.35
B. Sh.12,600
C. Sh.9,783.35
D. Sh.12,183.35 (2 marks)

24. Determine net amount payable to James Itumbi in a month.
A. Sh.37,400
B. Sh.35,000
C. Sh.40,216.65
D. Sh.42,616.65 (2 marks)

25. An employee is paid using a piece-rate system where he earns Sh.50 per unit produced. If the employee produces 300 units in a week, but also receives a bonus of Sh.500 for exceeding 250 units. What is his total wage for the week?
A. Sh.14,500
B. Sh.13,000
C. Sh.15,500
D. Sh.15,000 (2 marks)

26. An employee earns Sh.200 per hour for a 40-hour work week. She is paid 1.5 times the regular rate for any overtime hours. If the employee works 50 hours in a certain week. What is her total wage for the week?
A. Sh.11,000
B. Sh.10,000
C. Sh.12,000
D. Sh.15,000 (2 marks)

Use the information below to answer Question 27 to Question 29.

A company purchases machinery for Sh.500,000. The machinery has an estimated useful life of 10 years and a salvage value of Sh.50,000.

27. What is the book value of the machinery after 2 years using the straightline method of depreciation?
A. Sh.225,000
B. Sh.275,000
C. Sh.400,000
D. Sh.410,000 (2 marks)

28. What is the book value of the machinery after 2 years using reducing balance method of depreciation?
A. Sh.320,000
B. Sh.315,478.67
C. Sh.399,999.36
D. Sh.400,000 (2 marks)

29. What is the difference in book value of the machinery after 2 years using the straight line method and the reducing balance method of depreciation?
A. Sh.95,000
B. Sh.94,521.33
C. Sh.90,000
D. Sh.10,000.64 (2 marks)

30. If $A = \begin{pmatrix} 4 & 2 \\ -1 & K \end{pmatrix}$ and $A^{-1} = {}^{1}/_{8} \begin{pmatrix} K & -2 \\ 1 & 4 \end{pmatrix}$

What is the value of K?
A. 1.5
B. 2.5
C. 1
D. 8 (2 marks)

31. Given that $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $A^{-1} = \frac{1}{X}\begin{pmatrix} 4 & -2 \\ -3 & 1 \end{pmatrix}$

What is the value of X?

A. –0.5
B. 2
C. –2
D. 10 (2 marks)

32. On the number line, which one of the following figures represents the point that is 4 units to the right of –1?

A. 3
B. –3
C. –5
D. 5 (2 marks)

33. Given matrix X and matrix Y;

$X = \begin{pmatrix} a & 5 \\ 4 & 2 \end{pmatrix}$ and $Y = \begin{pmatrix} 1 & 3 \\ b & 6 \end{pmatrix}$

If $XY = \begin{pmatrix} 11 & 33 \\ 8 & 24 \end{pmatrix}$

Find the values of a and b.

A. a = 3, b = 1
B. a = 1, b = 2
C. a = 2, b = 2
D. a = 4, b = 2 (2 marks)

34. Factorise the quadratic expression $x^2 + 5x + 6$.

A. (x – 2) (x + 3)
B. (x + 1) (x + 6)
C. (x – 2) (x – 3)
D. (x + 2) (x + 3) (2 marks)

35. Solve the inequality $2(x – 1) > 3(x + 2)$.

A. $x < –8$
B. $x > –8$
C. $x < –7$
D. $x > –7$ (2 marks)

36. Find the derivative of the function; $fx = 5x^3 – 7x^{–2} + x$

A. $15x^2 – 14x^{–1} + 1$
B. $15x^2 + 14x^{–3} + 1$
C. $15x^2 – 14x^{–3} + 1$
D. $15x^2 + 14x^{–3}$ (2 marks)

37. The quantities X and Y are in the ratio 4:9. If the sum of X and Y is 65, what is the value of Y?

A. 15
B. 20
C. 45
D. 50 (2 marks)

38. The arithmetic mean of 5 observations –1, 0 , x, 8 and 17 is found to be 6. Determine the value of x.
A. 1
B. 6
C. 6.5
D. 30 (2 marks)

39. Which one of the following statements is **NOT** a property of a bar graph?
A. All the bars have a common base
B. All columns in the bar graphs have equal width
C. The width of the bar corresponds to the data value
D. The distance between each bar is the same (2 marks)

40. The market price of an item is Sh.56,000. Calculate the discount rate if a trader purchases the item at Sh.50,000.
A. 88%
B. 10.71%
C. 12.0%
D. 89.28% (2 marks)

41. An investor decides to invest Sh.100,000 at a simple interest rate of 12.5% per annum. After how many years would the amount double?
A. 6 years
B. 7.5 years
C. 8 years
D. 16 years (2 marks)

Use the information to answer Question 42 to Question 44.

A child has 4 blue marbles and 6 red marbles in a bag. A marble is chosen at random and then replaced in the bag. A second marble is now chosen at random.

42. What is the probability that the second marble chosen is red?
A. 3/5
B. 9/25
C. 2/5
D. 4/25 (2 marks)

43. What is the probability that the second marble chosen is blue?
A. 2/5
B. 3/5
C. 4/25
D. 9/25 (2 marks)

44. What is the probability that both marbles are of the same colour?
A. $^{6}/_{25}$
B. $^{12}/_{25}$
C. $^{2}/_{25}$
D. $^{7}/_{15}$ (2 marks)

Use the information to answer Question 45 to Question 50.

The demand function for a product is given by $P(x) = 100 – 2x$ where P is the price and x is the quantity sold. Similarly, the marginal cost function of the product is given as $MC = 6x$.

The total fixed cost associated with the product amount to Sh.50.

45. Determine the total revenue function (R).
A. $R = 100x – x^2$
B. $R = 100x – 2x^2$
C. $R = 100 – 2x^2$
D. $R = 500 – x$ (2 marks)

46. Determine the total cost function (C).

A. $C = 6x + 50$
B. $C = 6x^2 + 50$
C. $C = 3x^2 + 50x$
D. $C = 3x^2 + 50$ (2 marks)

47. Determine the profit function (P).

A. $P = -5x^2 + 100x - 50$
B. $P = -5x^2 + 100x + 50$
C. $P = -4x^2 + 100x - 50$
D. $P = 5x^2 + 100x - 50$ (2 marks)

48. Determine the number of units to be produced and sold in order to maximise profit.

A. 20 units
B. 15 units
C. 10 units
D. 5 units (2 marks)

49. Determine the optimal profit.

A. Sh.50
B. Sh.450
C. Sh.325
D. Sh.375 (2 marks)

50. What is the price charged at maximum profit?

A. Sh.80
B. Sh.60
C. Sh.70
D. Sh.100 (2 marks)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 20 August 2024. Afternoon Paper. **Time Allowed: 2 hours.**

This paper consists of fifty (50) Multiple Choice Questions. Answer ALL questions by indicating the letter (A, B, C or D) that represents the correct answer. Each question is allocated two (2) marks. Do NOT write anything on this paper.

1. Round off 74.568 to the nearest tenth.
   A. 74.6
   B. 75.0
   C. 75.51
   D. 74.5 (2 marks)

2. Calculate 20 ÷ (8 + 2) - 6.
   A. -5
   B. -4
   C. 4
   D. 5 (2 marks)

3. The ratio of boys to girls in a class is 3:5. There are 40 students in the class. How many more girls than boys are in the class?
   A. 8
   B. 10
   C. 24
   D. 25 (2 marks)

4. What type of a fraction is $K\ ^{x}/_{y}$?
   A. Proper fraction
   B. Improper fraction
   C. Mixed fraction
   D. Unknown fraction (2 marks)

5. Mary bought 6 trays of eggs. She accidentally fell and broke 15% of the eggs. How many eggs were left?
   A. 5 eggs
   B. 27 eggs
   C. 150 eggs
   D. 153 eggs (2 marks)

6. Which one of the following statements is a correct definition of a ratio?
   A. A ratio is a comparison of two quantities by subtraction
   B. A ratio is a comparison of two quantities by multiplication
   C. A ratio is a comparison of two quantities by division
   D. A ratio is a comparison of two quantities of two quantities by addition (2 marks)

7. Which one of the following expressions is a rate?
   A. 5:3
   B. 60 miles per hour
   C. 0.75
   D. $^3/_4$ (2 marks)

8. Convert 0.85 to percentage.
   A. 8.5%
   B. 85%
   C. 0.085%
   D. 0.85% (2 marks)

9. Factorise $x^2 + 5x + 6$.
   A. (x + 1) (x + 6)
   B. (x - 2) (x - 3)
   C. (x + 2) (x + 3)
   D. (x - 3) (x + 2) (2 marks)

10. Simplify (2x + 3) (x - 4).
   A. $2x^2 - 8$
   B. $2x^2 + 7x - 12$
   C. $2x^2 - 11x - 12$
   D. $2x^2 - 5x - 12$ (2 marks)

11. In the expression 5x + 3, what is x called?
   A. Constant
   B. Coefficient
   C. Variable
   D. Term (2 marks)

12. Which one of the following inequalities represents $x > 3$ on a number line?
   A. Open circle at 3 and shading to the right
   B. Closed circle at 3 and shading to the left
   C. Open circle at 3 and shading to the left
   D. Closed circle at 3 and shading to the right (2 marks)

13. Which one of the following intersections is the graphical solution of the system of linear equations:
   $y = 2x + 1$ and $y = -x + 4$?
   A. Intersection at (1, 3)
   B. Intersection at (2, 5)
   C. Intersection at (3, 2)
   D. Intersection at (1, 2) (2 marks)

14. Graph the inequality $y \leq 2x + 1$, which region represents the solution?
   A. The region above the line $y = 2x + 1$
   B. The region below the line $y = 2x + 1$
   C. The line $y= 2x + 1$ itself
   D. The region to the left of the line $y = 2x + 1$ (2 marks)

15. Differentiate the following function with respect to x:
   $Y = 2x^4 + 4x^3 – 6x + 5$
   A. $^{dy}/_{dx} = {}^2/_5x^5 + x^4 – 3x^2 + 5x$
   B. $^{dy}/_{dx} = 8x^3 - 12x^2 - 6$
   C. $^{dy}/_{dx} = {}^1/_2x^3 + {}^4/_3x^3 – 6x^2$
   D. $^{dy}/_{dx} = {}^2/_3x^3 + 2x^2 - 6$ (2 marks)

16. Calculate the area enclosed by the curve, $y = 3x^2 + 3x + 5$ for the interval $1 \leq x \leq 4$.

A. 7.5
B. 100.5
C. 108
D. 115.5 (2 marks)

17. Solve the inequality $2x - 10 \geq 3x + 4$.

A. $x \geq -14$
B. $x \leq -14$
C. $x \leq 6$
D. $x \geq -6$ (2 marks)

18. _____ is used to determine the gradient of a function.

A. Differentiation
B. Integration
C. Logarithm
D. Probability (2 marks)

19. Solve for x and y in the system of linear equations represented by $\begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5 \\ 6 \end{pmatrix}$

A. $x = 1, y = 2$
B. $x = 2, y = 1$
C. $x = 1.8, y = 1.4$
D. $x = 2, y = 2$

(2 marks)

20. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $A^{-1} = \frac{1}{\Delta} \begin{pmatrix} 4 & -2 \\ -3 & 1 \end{pmatrix}$

What is Δ?

A. -10
B. 1
C. -1
D. -2 (2 marks)

21. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, what is A^T (The transpose of A)?

A. $\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$

B. $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$

C. $\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$

D. $\begin{pmatrix} 4 & 3 \\ 2 & 1 \end{pmatrix}$ (2 marks)

22. Which one of the following points is a maximum of $f(x) = -2x^2 + 4x + 1$?

A. $x = -2$
B. $x = 1$
C. $x = 0$
D. $x = 2$ (2 marks)

23. Given the matrix $A = \begin{pmatrix} 5 & 3 \\ 4 & 2 \end{pmatrix}$ find A^{-1}.

A. $\frac{1}{2} \begin{pmatrix} 2 & -3 \\ -4 & 5 \end{pmatrix}$

B. $\frac{1}{-2} \begin{pmatrix} -2 & 3 \\ 4 & -5 \end{pmatrix}$

C. $\frac{1}{-2} \begin{pmatrix} 2 & -4 \\ -3 & 5 \end{pmatrix}$

D. $\frac{1}{-2} \begin{pmatrix} 2 & -3 \\ -4 & 5 \end{pmatrix}$ (2 marks)

24. If a store sells a product with a margin of 25% and the cost price is Sh.2,000. What is the selling price?
A. Sh.2,400
B. Sh.2,666.6
C. Sh.2,500
D. Sh.2,600 (2 marks)

25. What will be the future value of Sh.3,000 invested for 5 years at an annual interest rate of 4% compounded annually?
A. Sh.3,649.96
B. Sh.3,600
C. Sh.3,240
D. Sh.3,744 (2 marks)

26. How many years will it take for a principal of Sh.20,000 to earn Sh.6,000 as simple interest at an annual rate of 6%?
A. 4.5 years
B. 5 years
C. 6 years
D. 7 years (2 marks)

27. An equipment is purchased for Sh.20,000 and depreciates over 5 years using straight line method. If the residual value is Sh.2,000, what is the book value at the end of the third year?
A. Sh.9,200
B. Sh.12,000
C. Sh.8,000
D. Sh.14,000 (2 marks)

28. An asset appreciates from Sh.30,000 to Sh.36,300 in 2 years. What is the annual appreciation rate?
A. 11%
B. 10%
C. 10.5%
D. 21% (2 marks)

29. A trader imports goods worth Ksh.1,000,000 and freight charges of Ksh.250,000. Given the prevailing exchange rate of 1 UK pound = Ksh.200. Calculate the total cost of the goods in UK dollars.
A. UK dollar 6,250
B. UK dollar 250,000,000
C. UK dollar 5,000
D. UK dollar 1,250 (2 marks)

30. If the compound interest on a certain sum of money for 2 years at 5% per annum is Sh.512.5. What is the principal amount?
A. Sh.5,125
B. Sh.5,000
C. Sh.512.50
D. Sh.4,487.50 (2 marks)

31. What will be the amount after 2 years if Sh.20,000 is invested at an annual rate of 8% compounded quarterly?
A. Sh.37,018.60
B. Sh.23,328
C. Sh.23,200
D. Sh.23,433.19 (2 marks)

32. Given that Sh.500,000 is invested at an interest rate of 6% per annum., what is the interest after 3 years?
A. Sh.60,000
B. Sh.90,000
C. Sh.180,000
D. Sh.270,000 (2 marks)

33. A computer was bought for Sh.150,000 and its value decreased to Sh.120,000 after 2 years. Calculate the depreciation rate per year using straight line method.
A. 10%
B. 15%
C. 20%
D. 25% (2 marks)

34. A sales person earns a basic salary of Sh.15,000 per month plus a 10% commission on sales. Compute the total sales for the month if the total earnings for the month amount to Sh.40,000.
A. Sh.190,000
B. Sh.400,000
C. Sh.250,000
D. Sh.300,000 (2 marks)

35. An individual earns an annual income of Sh.60,000. The graduated income tax scheme is as follows:
10% on the first Sh.24,000
25% on the next Sh.8,333
30% on the remaining amount
The individual is also entitled to a tax relief of Sh.1,200. What is the total income payable?
A. Sh.13,983.35
B. Sh.11,583.35
C. Sh.18,000
D. Sh.12,783.35 (2 marks)

36. An employee earns Sh.150 per hour for the first 40 hours and Sh.225 per hour for overtime. If he worked for 45 hours a week, what is his total earnings?
A. Sh.6,000
B. Sh.10,125
C. Sh.7,125
D. Sh.6,750 (2 marks)

37. The length represented by class limits on the x-axis and class frequency on the y-axis is called _____.
A. frequency curve
B. frequency line
C. histogram
D. ogive curve (2 marks)

38. The ogive curve is represented by _____ along the x-axis and _____ along the y-axis respectively.
A. cumulative frequency, upper class limit
B. classes, class frequency
C. upper class boundaries, cumulative frequency
D. midpoint, cumulative frequencies (2 marks)

Use the following information to answer Question 39 to Question 41:

The annual profit earned in 32 companies are tabled below:

Profits Sh. "000"	Number of companies
16 – 25	3
26 – 35	4
36 – 45	8
46 – 55	10
56 – 65	5
66 – 75	2

39. What is the arithmetic mean profit?
    A. 45.5
    B. 50
    C. 46.5
    D. 42.5 (2 marks)

40. What is the modal profit?
    A. 48.857
    B. 48.571
    C. 48.071
    D. 48.357 (2 marks)

41. What is the median profit?
    A. 50.5
    B. 47
    C. 46.5
    D. 46.8 (2 marks)

Use the following data to answer Question 42 and Question 43:

12, 13, 14, 15.

42. Calculate the variance for the data.
    A. 1.1
    B. 1.25
    C. 5
    D. 13.5 (2 marks)

43. Calculate the standard deviation.
    A. 1.12
    B. 1.25
    C. 5
    D. 13.5 (2 marks)

44. A box contains 8 black balls and 5 white balls. If two balls are drawn at random without replacement, what is the probability that both balls are black?
    A. $^{8}/_{13}$
    B. $^{14}/_{39}$
    C. $^{56}/_{39}$
    D. $^{40}/_{143}$ (2 marks)

Use the following data to answer Question 45 to Question 47:
A tabulation of motor vehicles sold in a car bazaar in terms of their sources and by trader is given below:

	Trader A	**Trader B**
Imports	320	400
Exports	240	390

A motor vehicle is selected at random. What is the probability that the motor vehicle selected is:

45. An import or by trader B.
    A. 0.30
    B. 0.59
    C. 0.77
    D. 0.82 (2 marks)

46. An export given that its by trader A.
    A. 0.07
    B. 0.20
    C. 0.43
    D. 0.70 (2 marks)

47. An import from trader A.
    A. 0.24
    B. 0.53
    C. 0.70
    D. 0.94 (2 marks)

48. A product cost Sh.2,000. If it is sold for Sh.3,000. What is the mark-up percentage?
    A. $33^{1}/_{3}\%$
    B. 25%
    C. 50%
    D. $66^{2}/_{3}\%$ (2 marks)

49. What is the probability of rolling a 3 or a 4 on a fair six-sided dice?
    A. $^{7}/_{6}$
    B. $^{1}/_{3}$
    C. $^{1}/_{36}$
    D. $^{11}/_{36}$ (2 marks)

50. Conditional probability refers to _____.
    A. the probability of two mutually exclusive events
    B. the probability of a simple event
    C. the probability of an event given that another event has occurred
    D. the probability of an independent event (2 marks)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 23 April 2024. Afternoon Paper. **Time Allowed: 2 hours.**

This paper is made up of fifty (50) Multiple Choice Questions. Answer ALL questions by indicating the letter (A, B, C or D) that represents the correct answer. Each question is allocated two (2) marks. Do NOT write anything on this paper.

1. Three numbers are in the ratio of 2:3:5. If the sum of the numbers is 150. Find the smallest number.
   A. 30
   B. 45
   C. 75
   D. 100 (2 marks)

2. When 0.45 is written in its simplest form, the sum of the numerator and the denominator is _____.
   A. 9
   B. 11
   C. 20
   D. 29 (2 marks)

3. What is 0.00652445 to 5 significant figures?
   A. 0.00652
   B. 0.0065245
   C. 0.0065244
   D. 0.0065 (2 marks)

4. If x: y = 3:4; find the value of (3x + 4y): (x + 3y).
   A. 3:5
   B. 5:3
   C. 4:3
   D. 3:4 (2 marks)

5. What is the derivative of $f(x) = 5x^3 – 2x^2 + 4x + 1$?
   A. $15x^2 – 4x + 4$
   B. $15x^2 – 4x + 1$
   C. $10x^2 – 4x + 4$
   D. $10x^2 – 4x + 1$ (2 marks)

6. What is the equation of a straight line passing through the following points (-1, -1) and (-4, -7).
   A. y = 3 + 6x
   B. y= 2x + 1
   C. y = -x + -1
   D. y = -4x -7 (2 marks)

7. Calculate the gradient of a straight line passing through the following points; (-1, -1) and (0, 2).
   A. 3
   B. -1
   C. -3
   D. 2 (2 marks)

8. Calculate the y intercept of the straight line, $6x = -2y + 1$.
   A. 1
   B. ½
   C. 3
   D. 6 (2 marks)

9. The manager of a motor cycle shop has found out that at a price of $p = 150 – 0.25q$ per motor cycle q motor cycles will be sold.

   Find the number of motor cycle sales that leads to maximum revenue.
   A. 300
   B. 3000
   C. 150
   D. 600 (2 marks)

10. Determine the minimum value of, $y = 4x^2 + 4x + 5$.
   A. $x = 0.5$
   B. $x = -0.5$
   C. $x = 2$
   D. $x = -2$ (2 marks)

11. Factorise $y^2 + 15y + 56$.
   A. $(y + 7)(y + 8)$
   B. $(y - 7)(y - 8)$
   C. $(y - 7)(y + 8)$
   D. $(y + 7)(y - 8)$
   (2 marks)

12. Evaluate the integral $(4x^3 + 2x)\,dx$.
   A. $2x^4 + x + c$
   B. $x^4 + x + c$
   C. $x^4 + x^2$
   D. $x^4 + x^2 + c$ (2 marks)

13. Find the solution to inequality $–y + 9 \geq 3$.
   A. $y \leq -3$
   B. $y \geq -3$
   C. $y \leq -6$
   D. $y \geq -6$ (2 marks)

14. Solve the compound inequality $2 < 3x – 4 \leq 8$.
   A. $-2 < x \leq 4$
   B. $-2 \leq x < 4$
   C. $2 < x \leq 4$
   D. $2 \leq x < 4$ (2 marks)

15. Huyu Ndale an employee in Hawa Limited is paid based on fixed salary and a commission. The fixed salary is Sh.7,000 per month. In a certain month, Huyu sold goods worth Sh.10,000 where commission is 15% on sales above Sh.5,000.

   Determine his total earning in that month.
   A. Sh.5,750
   B. Sh.7,750
   C. Sh.8,500
   D. Sh.12,000 (2 marks)

16. How much should I put in my savings account now if I want Sh.50,000 to purchase a machine in two years' time? Assume the rate of interest is 9% compounded monthly.
   A. Sh.42,084
   B. Sh.45,871.56
   C. Sh.41,791.57
   D. Sh.42,372.88 (2 marks)

17. I currently have Sh.30,000 but I require Sh.50,000 in three years' time. What rate of compound interest payable annually must I receive on the Sh.30,000 to make this possible?
A. 66.67%
B. 44.44%
C. 22.22%
D. 18.56% (2 marks)

18. At the beginning of a year, the population of a small village is 8,400. If the annual rise in population is 12%.

Find the population at the end of the year.
A. 8,520
B. 9,408
C. 8,412
D. 9,600 (2 marks)

19. On selling an article for Sh.24,000, a trader makes a loss of 4% on the cost price. In order to make a profit of 10% on the cost price, what must be the selling price of that article?
A. Sh.26,400
B. Sh.27,300
C. Sh.27,500
D. Sh.28,000 (2 marks)

20. A product has a markup of 40% and selling price is Sh.1,400. What is the cost price?
A. Sh.800
B. Sh.900
C. Sh.1,000
D. Sh.1,100 (2 marks)

21. If an item is sold for Sh.2,000 with a 25% margin, what is its cost price?
A. Sh.1,400
B. Sh.1,500
C. Sh.1,600
D. Sh.1,700 (2 marks)

22. A business exported goods worth Ksh.5,600,000 to USA. The prevailing exchange rate was 1 USD = Ksh.140.

Calculate the value of the goods in USD.
A. USD 40,000
B. USD 400,000
C. USD 78.400
D. USD 784,000 (2 marks)

23. A trader imported apples from South Africa at a cost of 5,000 South Africa Rands. The transport cost was 10% of the value of the apples in South Africa Rands.

Determine the cost of the apples in Kenya Shillings if 1 South Africa Rand = Ksh.28.
A. Sh.5,500
B. Sh.140,000
C. Sh.154,000
D. Sh.196.43 (2 marks)

24. A sampling method where all units in a distribution have an equal chance of being included in a sample is referred to as _____.
A. Convenience sampling
B. Purposive sampling
C. Snowball sampling
D. Simple random sampling (2 marks)

25. A manufacture sells his products to a distributor at a markup of 25%. The distributor sells the products to a wholesaler at Sh.1,200,000 at a markup of 20%.

Calculate the cost of manufacturing the product.

A. Sh.240,000
B. Sh.800,000
C. Sh.960,000
D. Sh.1,000,000 (2 marks)

26. An employee earns a taxable monthly income of Sh.45,000. If the tax rate is 10% for the first Sh.15,000, 15% for the next Sh.10,000 and 25% for any amount above Sh.25,000. The employee contributes Sh.1,200 per month for NHIF.

Calculate the net income after tax.

A. Sh.9,200
B. Sh.33,750
C. Sh.35,800
D. Sh.38,000 (2 marks)

27. Find the inverse of $A = \begin{pmatrix} 3 & -1 \\ -5 & 2 \end{pmatrix}$

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

B. $\begin{pmatrix} 3 & 1 \\ 5 & 2 \end{pmatrix}$

C. $\begin{pmatrix} 2 & -5 \\ -1 & 3 \end{pmatrix}$

D. $\begin{pmatrix} 3 & 1 \\ 5 & 2 \end{pmatrix}$ (2 marks)

Use the information to answer questions 28 to 31.

A researcher has collected the following data 3, 5, 12, 3 and 2. The mean of the sample is 5.

28. Determine the variance.

A. 4.062
B. 13.2
C. 16.5
D. 66 (2 marks)

29. Determine the standard deviation.

A. 3.633
B. 4.062
C. 8.944
D. 13.2 (2 marks)

30. Determine the range.

A. 1
B. 2
C. 10
D. 12 (2 marks)

31. Determine the interquartile range.

A. 1
B. 2
C. 10
D. 12 (2 marks)

32. Which sampling method involves dividing the population into sub groups and then randomly selecting from the subgroups?

A. Cluster sampling
B. Simple random sampling
C. Stratified sampling
D. Systematic sampling (2 marks)

33. If matrix R = $\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$

What is the transpose of matrix R?

A. $\begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$

B. $\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$

C. $\begin{pmatrix} 4 & 3 \\ 1 & 2 \end{pmatrix}$

D. $\begin{pmatrix} 3 & 4 \\ 2 & 1 \end{pmatrix}$ (2 marks)

34. What is the median of the following set of scores:

18, 6, 12, 10, 14

A. 10
B. 14
C. 18
D. 12 (2 marks)

Use the data to answer question 35 to question 38.

The table below shows the distribution of monthly salaries of 300 employees.

Monthly salary Sh.“000”	Number of employees
5 -10	16
10 - 15	24
15 - 20	58
20 - 25	100
25 - 30	42
30 - 35	30
35 - 40	20
40 - 45	10

35. Half of the employees earn a monthly salary of how much or less.

A. Sh.22,600
B. Sh.20,000
C. Sh.22,500
D. Sh.25,000 (2 marks)

36. About 40% of the employees earn more than what amount?

A. Sh.21,100
B. Sh.23,500
C. Sh.24,100
D. Sh.25,000 (2 marks)

37. Compute the mean monthly salary for the employees.
    A. Sh.20,000
    B. Sh.22,500
    C. Sh.23,300
    D. Sh.22,600 (2 marks)

38. Which measure of central tendency is most affected by the outliers?
    A. Mode
    B. Median
    C. Mean
    D. Variance (2 marks)

39. The average monthly production of a factory for the first 8 months is 2,500 units and for the next 4 months, the production is 1,200 units. The average monthly production of the year will be?
    A. 2,067
    B. 1,850
    C. 308
    D. 6,125 (2 marks)

40. Which of the following is **NOT** a qualitative variable?
    A. The life of an automobile battery estimated at 42 months
    B. A student religious affiliation
    C. The country of origin for employees attending a training
    D. The type of car owned by members of a club (2 marks)

41. Suppose we count the number of students attending a football match and report how many are boys and how many are girls.

    What type of measurement is this?
    A. Interval
    B. Nominal
    C. Ratio
    D. Ordinal (2 marks)

42. What is the level of measurement for students on the first statistics test?
    A. Nominal
    B. Interval
    C. Ratio
    D. Ordinal (2 marks)

Use the data to answer question 43 to question 44.

Below is a frequency distribution:

Selling price (Sh."000")	**Frequency**
15 – 17	8
18 – 20	23
21 – 23	17

43. What are the coordinates for the first class for a frequency polygon?
    A. (15, 8)
    B. (17, 8)
    C. (16, 8)
    D. (16.5, 8) (2 marks)

44. What is the class size for the second class?
    A. 2
    B. 18
    C. 20
    D. 3 (2 marks)

Use the table below to answer question 45 to question 47.

Second Event	First Event		
	A_1	A_2	A_3
B_1	2	1	3
B_2	1	2	1

45. Determine $p(A_1)$

A. $^1/_3$
B. $^1/_4$
C. $^3/_{10}$
D. $^1/_{10}$ (2 marks)

46. Determine $p(B_1/A_2)$.

A. $^1/_3$
B. $^1/_{10}$
C. $^1/_6$
D. $^1/_2$ (2 marks)

47. Determine p (B_2 and A_3).

A. $^1/_4$
B. $^1/_{10}$
C. $^1/_2$
D. $^4/_5$ (2 marks)

48. Solve the following experimental equation for x:

$16^{-x+2} = 8$

A. 5
B. 2.75
C. -2.75
D. 1.25 (2 marks)

49. Using the property of logarithms, write the following as a single logarithm:

$\text{Log}_a x + \text{Log}_a (x - 1)$.

A. $\text{Log}_a x (x - 1)$
B. $\text{Log}_a {}^x/_{x-1}$
C. $\dfrac{\text{Log}_a x}{\text{Log}_a (x-1)}$
D. $\text{Log}_a x - \text{Log}_a (x-1)$ (2 marks)

50. What is the primary purpose of a contingency table?

A. Analysing relationship between categorical variable
B. Display trends in time series data
C. Representing numerical data
D. Summarising continuous data (2 marks)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 5 December 2023. Afternoon Paper. **Time Allowed: 2 hours.**

This paper is made up of fifty (50) Multiple Choice Questions. Answer ALL questions by indicating the letter (A, B, C or D) that represents the correct answer. Each question is allocated two (2) marks.

1. What per cent of 80 is 12?
   A. 6.67%
   B. 66.7%
   C. 15%
   D. 9.6% (2 marks)

2. Convert the decimal number 3.98 to a percentage.
   A. 3.98%
   B. 0.0398%
   C. 39.8%
   D. 398% (2 marks)

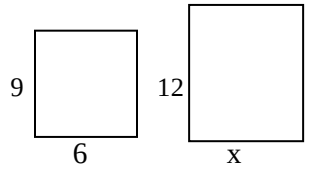
3. Convert 75.20% into a decimal number.
   A. 0.752
   B. 7.52
   C. 75.2
   D. 0.0752 (2 marks)

4. Convert $5^1/_4$% to a fraction in lowest terms?
   A. $^{21}/_4$
   B. $^{21}/_{400}$
   C. $^{19}/_{40}$
   D. $^{52}/_5$ (2 marks)

5. Write the ratio 0.08:0.12 as a fraction in lowest terms.
   A. $^2/_3$
   B. $^3/_2$
   C. $^1/_{15}$
   D. $^{20}/_3$ (2 marks)

6. Convert the ratio $^2/_3 : {}^4/_9$ into a fraction.
   A. $^6/_1$
   B. $^2/_3$
   C. $^1/_6$
   D. $^3/_2$ (2 marks)

7. Assume the figures below are proportional. Find the value of x.



A. 4.5
B. 8
C. 18
D. 36 (2 marks)

8. Round off 7,510 to the nearest thousand.
A. 7,500
B. 7,600
C. 7,000
D. 8,000 (2 marks)

9. A ratio equivalent to 3:8 is.
A. 3:11
B. 6:24
C. 9:24
D. 18:40 (2 marks)

10. Two numbers are in the ratio 7:9. If the sum of the numbers is 112 then the larger number is.
A. 49
B. 42
C. 63
D. 72 (2 marks)

11. The ratio of 1.5m to 10cm is.
A. 1:5
B. 15:10
C. 10:15
D. 15:1 (2 marks)

12. The length and width of a rectangle are in the ratio 3:2. If the width of the rectangle is 28cm, then the length of the rectangle is?
A. 18
B. 42
C. 70
D. 56 (2 marks)

13. Three business partners, Mary, John and Peter share profits in the ratio of 3:3:4 respectively. If Peter received Sh.90,000. How much was the profit earned?
A. Sh.36,000
B. Sh.54,000
C. Sh.225,000
D. Sh.200,000 (2 marks)

14. Jane saves 2/5 of her salary in a SACCO every month. How much will she have saved in 9 months if she earns a monthly salary of Sh.40,000.
A. Sh.16,000
B. Sh.24,000
C. Sh.144,000
D. Sh.214,000 (2 marks)

15. Find the indefinite integral $\int(2.7q^2 - 18q + 15)dq$

A. $0.9q^3 - 9q^2 + 15q + k$
B. $5.4q - 18$
C. $0.9q^3 - 9q^2 + 15q$
D. $5.4q^3 - 18q^2 + 15q + k$ (2 marks)

16. Solve the following inequality $19 \geq 4 - 5X$

A. $X \leq -3$
B. $X \geq -4.6$
C. $X \geq -3$
D. $X \leq 4.6$ (2 marks)

17. The transpose of a 2 X 3 matrix is.

A. Square matrix
B. Identity matrix
C. Inverse matrix
D. 3 X 2 matrix (2 marks)

18. Given that: matrix A = $\begin{pmatrix} 3 & 2 \\ 6 & 9 \end{pmatrix}$ B = $\begin{pmatrix} 5 & 8 \\ 1 & 3 \end{pmatrix}$. Find AB

A. $\begin{pmatrix} 17 & 30 \\ 39 & 75 \end{pmatrix}$

B. $\begin{pmatrix} 17 & 30 \\ 9 & 75 \end{pmatrix}$

C. $\begin{pmatrix} 17 & 39 \\ 30 & 75 \end{pmatrix}$

D. $\begin{pmatrix} 17 & 30 \\ 39 & 25 \end{pmatrix}$ (2 marks)

19. Factorise $12x^2 - 20x + 3$

A. $(2x + 3)(6x - 1)$
B. $(2x - 3)(6x + 1)$
C. $(2x + 3)(6x + 1)$
D. $(2x - 3)(6x - 1)$ (2 marks)

20. Given that: $k = 2$ and $n = 5$
Evaluate $2kn^2 - kn + k^2 + 10$

A. 104
B. 100
C. 10
D. 124 (2 marks)

21. Expand $(2x - 5)(3x - 4)$

A. $6x^2 + 23x + 20$
B. $6x^2 - 23x - 20$
C. $-6x^2 - 23x + 20$
D. $6x^2 - 23x + 20$ (2 marks)

22. Differentiate the following function with respect to x:
$y = 2x^3 + 2x^2 + 6x + 8$

A. $\partial y/\partial x = 6x^2 + 4x + 6$
B. $\partial y/\partial x = 6x^3 + 4x + 6$
C. $\partial y/\partial x = 6x^2 + 4x - 6$
D. $\partial y/\partial x = 3x^2 + 4x + 6$ (2 marks)

Use the following information to answer Question 23 – Question 27.

$P = \begin{pmatrix} 2 & 1 \\ 3 & 1 \end{pmatrix}$ $Q = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ $R = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ $S = \begin{pmatrix} 1 & -2 \\ -6 & 3 \end{pmatrix}$

Given that $aP + bQ = S$

23. Find a
A. -2
B. 2
C. 5
D. 3 (2 marks)

24. Find b
A. -5
B. 2
C. 5
D. -6 (2 marks)

25. Find the determinant of P
A. 1
B. 0
C. -1
D. 5 (2 marks)

26. Find P^{-1}

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

B. $\begin{pmatrix} 1 & -1 \\ -3 & 2 \end{pmatrix}$

C. $\begin{pmatrix} 1 & -1 \\ -3 & 2 \end{pmatrix}$

D. $\begin{pmatrix} 2 & 3 \\ 1 & 1 \end{pmatrix}$ (2 marks)

27. Find S^T

A. $\begin{pmatrix} 1 & -6 \\ 2 & 3 \end{pmatrix}$

B. $\begin{pmatrix} -6 & 3 \\ 1 & -2 \end{pmatrix}$

C. $\begin{pmatrix} 1 & -6 \\ -2 & 3 \end{pmatrix}$

D. $\begin{pmatrix} -1 & 2 \\ 6 & -3 \end{pmatrix}$ (2 marks)

28. The marked price of a book was Sh.500. The book was sold for Sh.450. What is the percentage discount offered on the product?
A. 5%
B. 10%
C. 11%
D. 50% (2 marks)

29. Dennis Juma bought a bike for Sh.7,500. He wants to sell it by making a profit of 25% on the selling price. What is the selling price of the bike?
A. Sh.9,375
B. Sh.5,625
C. Sh.10,000
D. Sh.9,500 (2 marks)

30. Rita Mueni sold apples for Sh.400. She made a profit of 25% on cost. Find the cost price of the apples.
A. Sh.320
B. Sh.200
C. Sh.300
D. Sh.250 (2 marks)

31. The student population of a college is increasing at the rate of 20% per annum. Calculate the student population after three years if the current population is 1,000.
A. 1,200
B. 1,440
C. 1,728
D. 3,600 (2 marks)

32. The production of a firm rose to 2,500 bags from 1,600 bags in two years. Find the rate of growth per annum.
A. 25%
B. 20%
C. 200%
D. 250% (2 marks)

33. Under the reducing balance method of providing for depreciation, the amount of depreciation _____.
A. Increases every year
B. Remains constant
C. Decreases every year
D. Increases or decreases every year (2 marks)

34. Calculate the amount of interest earned if a sum of Sh.800,000 is invested for three years at a simple interest rate of 8% per annum.
A. Sh.192,000
B. Sh.608,000
C. Sh.80,000
D. Sh.992,000 (2 marks)

35. The cost of a motor vehicle in Britain is 30,500 British Pounds (£). Determine the cost of the motor vehicle in Kenya Shillings (KES) assuming the prevailing exchange rate is 1 British pound (£) = 132 KES.
A. Sh.4,026,000
B. Sh.231.06
C. Sh.231,060.60
D. Sh.4,000,000 (2 marks)

36. Lydia Njuguna bought a delivery van for Sh.2,800,000. The car depreciates at the rate of 14% per annum on a straight line basis. Calculate the value of the car after 2 years.
A. Sh.2,016,000
B. Sh.784,000
C. Sh.2,000,000
D. Sh.2,006,000 (2 marks)

37. The price of 1kg of cooking fat has increased by 20% over the last one month to retail at Sh.240 per kg. Calculate the retail price per kg before the price increases.
A. Sh.160
B. Sh.200
C. Sh.300
D. Sh.280 (2 marks)

38. ABC Ltd pays its employees on hourly basis. The normal rate per hour is Sh.200 while overtime is paid at the rate of 25% above the normal hourly rate. The normal working hours per week are 32 hours. Calculate the weekly wage for an employee who worked for 40 hours.
A. Sh.6,400
B. Sh.8,000
C. Sh.8,400
D. Sh.10,000 (2 marks)

39. Michael Oketch makes an initial investment of Sh.X at 10% compound interest in ABC bank. Calculate the value of X if at the end of 3 years the total amount in the investment account is Sh.85,184.
A. Sh.59,628.80
B. Sh.60,000
C. Sh.64,000
D. Sh.76,665.60 (2 marks)

40. What will be the amount to be paid at the end of three years on Sh.3,500 at an interest rate of 2% per annum compounded half-yearly?
A. Sh.3,606.054
B. Sh.3,710
C. Sh.3,715.3205
D. Sh.3,714.228 (2 marks)

41. The mean cost of 12 items is Sh.225. What is the cost of the 13^{th} item that causes the mean to become Sh.250?
A. Sh.250
B. Sh.237.5
C. Sh.550
D. Sh.475 (2 marks)

Use the frequency distribution below to answer Question 42 to Question 44.

Score	19	23	27	30	32	34	39	43
Frequency	2	4	8	12	13	7	4	3

42. Find the mean score.
A. 30
B. 30.275
C. 31.04
D. 32 (2 marks)

43. Find the median score.
A. 27
B. 30
C. 34
D. 32 (2 marks)

44. Find the standard deviation of the scores.
A. 4.90
B. 5.23
C. 24
D. 27.32 (2 marks)

Use the information below to answer Question 45 to Question 47.

A box contains 4 blue balls and 6 red balls. A ball is drawn from the box and then replaced. A second ball is then drawn. Find the probabilities that:

45. Both balls will be blue.
    A. $^{4}/_{5}$
    B. $^{4}/_{25}$
    C. $^{2}/_{15}$
    D. $^{4}/_{10}$ (2 marks)

46. One ball will be blue and the other red.
    A. $^{6}/_{25}$
    B. 1
    C. $^{19}/_{25}$
    D. $^{12}/_{25}$ (2 marks)

47. At least one blue ball is drawn.
    A. $^{9}/_{25}$
    B. $^{6}/_{25}$
    C. $^{16}/_{25}$
    D. $^{19}/_{25}$ (2 marks)

48. Two events are said to be dependent if _____.
    A. They can happen together
    B. They cannot happen together
    C. The occurrence or non-occurrence of one event does not affect the occurrence or non-occurrence of the other event
    D. The occurrence or non-occurrence of one event affects the occurrence or non-occurrence of the other event (2 marks)

49. The probability of one event happening is referred to as:
    A. Simple probability
    B. Marginal probability
    C. Joint probability
    D. Equally likely event (2 marks)

50. Determine the modal value in the following distribution:
    2, 4, 7, 9, 3, 0, 5, 3, 1, 7, 9, 3
    A. 3
    B. 7
    C. 9
    D. 2 (2 marks)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 22 August 2023. Afternoon Paper. **Time Allowed: 2 hours.**

This paper is made up of fifty (50) Multiple Choice Questions. Answer ALL questions by indicating the letter (A, B, C or D) that represents the correct answer. Each question is allocated two (2) marks. Do NOT write anything on this paper.

1. How do you write 0.08 as a percentage?
   A. 80%
   B. 0.08%
   C. 8%
   D. 0.8% (2 marks)

2. Round off 34.478 to the nearest whole number.
   A. 34
   B. 35
   C. 34.5
   D. 36 (2 marks)

3. If 59,049 kgs is divided in the ratio 3:2:4, the minimum difference between any two shares is?
   A. 6,561 kgs
   B. 13,122 kgs
   C. 19,683 kgs
   D. 26,244 kgs (2 marks)

4. The student enrolment at Elimu College in the year 2021 was 820 and this rose to 1,000 in the year 2022. Express the increase in student enrolment in the year 2022 as a percentage of the student enrolment in 2021.
   A. 18%
   B. 21.95%
   C. 82%
   D. 121.95% (2 marks)

5. $33^{1}/_{3}\%$ of a football field is 7,200 metres. What is the complete length of the field?
   A. 2,400 metres
   B. 4,800 metres
   C. 12,00 metres
   D. 21,600 metres (2 marks)

6. Find the unknown in the following proportion:

   $$^{13.6}/_{48} = {}^{y}/_{384}$$

   A. 0.00074
   B. 1.70
   C. 108.80
   D. 1,355.29 (2 marks)

7. Which one of the following is **NOT** a type of a bar chart?
   A. Simple bar chart
   B. Complex bar chart
   C. Component bar chart
   D. Multiple bar chart (2 marks)

8. A, B and C are in partnership sharing profits in the ratio of 2:3:6 respectively. In the year 2022, the business made a profit of Sh.220,000. How much more did C get than A?
   A. Sh.40,000
   B. Sh.60,000
   C. Sh.80,000
   D. Sh.120,000 (2 marks)

9. Which one of the following is not a diagram used in the presentation of statistical data?
   A. Pictogram
   B. Ogive
   C. Pie chart
   D. Bar chart (2 marks)

10. Two events are said to be dependent if _____.
   A. They can happen together
   B. They cannot happen together
   C. The occurrence or non-occurrence of one event affects the occurrence or non-occurrence of the other
   D. The occurrence or non-occurrence of one event does not affect the occurrence or non-occurrence of the other event (2 marks)

11. Expand (a + 2) (a – 3)
   A. $a^2 + 2a - 5$
   B. $a^2 - a - 6$
   C. $a^2 - 5a - 6$
   D. $a^2 - 3a - 6$ (2 marks)

12. Integrate the following function: $y = 4X^3$
   A. $y = 4X^4 + C$
   B. $y = 4X^4$
   C. $y = X^4 + C$
   D. $y = 12X^2$ (2 marks)

13. Which one of the following methods cannot be used to find the mode?
   A. Frequency polygon
   B. Frequency histogram
   C. Stem and leaf plot
   D. Percentage ogive (2 marks)

14. Differentiate the following equations with respect to X
   $Y = -3X^3 + 3X^2 - X + 20$
   A. $Y = -9X^3 + 6X - 1$
   B. $Y = -9X^2 + 6X - 1$
   C. $Y = -9X^2 + 6X - 21$
   D. $Y = -9X^2 + 6X$ (2 marks)

15. Solve the equation

$$\frac{2}{3}(12y - 6) = \frac{2}{5}(15y + 10)$$

A. 0
B. 4/7
C. 4
D. $1\frac{3}{4}$ (2 marks)

16. A dance club had 7 fewer boys than girls. The total number of students in the club was 19. Find the number of girls.

A. 6
B. 7
C. 12
D. 13 (2 marks)

17. Jack Omollo ordered 27 roses. Some of the roses were red while others were white in colour. The red roses cost Sh.70 each while the white roses cost Sh.110 each. The total cost of the roses was Sh.2,450. Find the number of red roses ordered.

A. 12
B. 13
C. 15
D. 14 (2 marks)

18. Given that the point P (8, -12) lies on the line -8x + ty + 40 = 0. Find the value of t.

A. -2
B. 0.5
C. 2
D. $5\frac{1}{3}$ (2 marks)

19. Find the equation of the line with X intercept = 30 and Y intercept = 40

A. Y = ¾X + 40
B. Y = 40
C. X = 30
D. Y = $-\frac{4}{3}X + 40$ (2 marks)

20. Solve the equation $X^2 + 7X + 12 = 0$

A. X = - 4 and X = - 3
B. X = + 4 and X = - 3
C. X = +4 and X = +3
D. X = - 4 and X = +3 (2 marks)

21. Which one of the following is **NOT** a characteristic of the arithmetic mean?

A. It is rigidly defined
B. It is not affected by extreme values
C. It uses all the data values
D. It is easy to calculate (2 marks)

22. Solve the inequality $x + 3 \geq 7 + 3x$

A. $X \geq 2.5$
B. $X \leq 2.5$
C. $X \leq -2$
D. $X \geq -2$ (2 marks)

23. Find the value of $x + y$ if:

$$\begin{pmatrix} 2x & 5 \\ 7 & -y \end{pmatrix} = \begin{pmatrix} 8 & 5 \\ 7 & 3 \end{pmatrix}$$

A. 4
B. 1
C. -3
D. 6 (2 marks)

24. Given that $A = \begin{pmatrix} 1 & 3 & 5 \\ 2 & 4 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 3 \\ 1 & 5 \\ 0 & 4 \end{pmatrix}$

Find A x B

A. $\begin{pmatrix} 5 & 8 \\ 38 & 38 \end{pmatrix}$

B. $\begin{pmatrix} 5 & 38 \\ 8 & 38 \end{pmatrix}$

C. $\begin{pmatrix} 2 & 9 \\ 2 & 20 \\ 0 & 12 \end{pmatrix}$

D. Incompatible (2 marks)

25. If $A = \begin{pmatrix} 2 & 4 \\ 8 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 5 \\ 4 & 3 \end{pmatrix}$

Find 3A - 4B

A. $\begin{pmatrix} -2 & 8 \\ -8 & -6 \end{pmatrix}$

B. $\begin{pmatrix} 1 & -1 \\ 4 & 3 \end{pmatrix}$

C. $\begin{pmatrix} 2 & -8 \\ 8 & 6 \end{pmatrix}$

D. $\begin{pmatrix} -2 & 8 \\ -8 & -6 \end{pmatrix}$ (2 marks)

26. Find the inverse of the following matrix:

$$A = \begin{pmatrix} 6 & 2 \\ 8 & 3 \end{pmatrix}$$

A. $\frac{1}{2}\begin{pmatrix} 3 & 2 \\ -8 & 6 \end{pmatrix}$

B. $\frac{1}{2}\begin{pmatrix} 3 & -2 \\ 8 & 6 \end{pmatrix}$

C. $\frac{1}{2}\begin{pmatrix} 3 & -2 \\ -8 & 6 \end{pmatrix}$

D. $\frac{1}{2}\begin{pmatrix} 3 & 2 \\ 8 & 6 \end{pmatrix}$ (2 marks)

27. If we multiply the original matrix with its inverse, we always get a _____.
A. Zero matrix
B. Diagonal matrix
C. Scalar matrix
D. Identity matrix (2 marks)

28. Two matrices are compatible for addition and subtraction if and only if:
A. They are square matrices
B. The number of rows in the first matrix equals the number of rows in the second matrix
C. The number of columns in the first matrix equals the number of rows in the second matrix
D. They are of the same order (2 marks)

29. Maji Limited purchases water taps at a cost of Sh.2,880 each. Assume its operating expenses are 25% of its cost and that the company wishes to make a net profit of 20% of its selling price. Find the selling price of each water tap.
A. Sh.4,320
B. Sh.3,600
C. Sh.4,500
D. Sh.4,800 (2 marks)

30. The selling price of a house is Sh.19,575,000. If the mark-up is 35% on the cost price, find the profit made on each house sold.
A. Sh.5,075,000
B. Sh.12,723,750
C. Sh.6,851,250
D. Sh.14,500,000 (2 marks)

31. Eric Bwire took a business loan of Sh.340,000 at a simple interest rate of 14% per annum for 5 years. Calculate the total interest paid on the loan.
A. Sh.47,600
B. Sh.95,200
C. Sh.102,000
D. Sh.238,000 (2 marks)

32. Find the accumulated amount that Dennis Waweru will have after 4 years if he invested Sh.40,000 at 12% compounded semi-annually.
A. Sh.62,940.77
B. Sh.59,200
C. Sh.63,753.92
D. Sh.49,600 (2 marks)

33. Find out how much money James Kioni should invest in a bank paying interest at a rate of 8% per year compounded monthly so that at the end of 2 years, the accumulated amount will be Sh.120,000.
A. Sh.103,448.28
B. Sh.102,880.66
C. Sh.100,800
D. Sh.102,311.57 (2 marks)

34. Compound interest is where _____.
A. Interest is higher than the principal amount
B. Interest is calculated on the principal amount
C. Interest is calculated on the principal amount plus the accumulated interest
D. Interest is calculated on the principal amount minus the accumulated interest (2 marks)

35. A pick-up whose cost is Sh.2,000,000 will depreciate to a scrap value of Sh.655,360 in 5 years. What is the rate of depreciation if the reducing balance method is used to compute depreciation?
A. 80%
B. 32.768%
C. 20%
D. 67.232% (2 marks)

36. A sales person bought a van for Sh.1,800,000. The van depreciates at the rate of 10% per annum on reducing balance. Calculate the accumulated depreciation after 3 years.
A. Sh.342,000
B. Sh.487,800
C. Sh.540,000
D. Sh.1,312,200 (2 marks)

37. Grace Wekesa bought 6 computers for 6,200 US Dollars (USD). Calculate the cost of the computers in Kenya Shillings (Ksh) if the prevailing exchange rate at the time was 1 USD = Ksh.135
A. Ksh. 45.93
B. Ksh. 6,200
C. Ksh. 837,000
D. Ksh. 123,500 (2 marks)

38. An importer based in Kenya imported 30 bales of clothes from United Kingdom at a cost of 66 Sterling Pounds (£) per bale. He also incurred Ksh.100,000 on freight charges, 2% insurance in transit charge on the bale cost and also paid Ksh.1,000 per bale as customs duty. Calculate the value of the goods in Kenya Shillings if the prevailing exchange rate was 1£ = Ksh. 145.
A. Ksh.287,100
B. Ksh.387,100
C. Ksh.417,100
D. Ksh.422,842 (2 marks)

39. James Omondi works in a company and is paid an hourly rate of Sh. 200. A normal working day has 8 hours and the employees are expected to work for 5 days a week. In the second week of June, James Omondi worked for 48 hours. Overtime is paid at a rate of 50% above the normal rate. Calculate the weekly wages earned by James Omondi during that second week of June.
A. Sh.2,400
B. Sh.8,000
C. Sh.9,600
D. Sh.10,400 (2 marks)

40. An employee earns a taxable income of Sh.60,000 per month. If the tax rate is 15%, calculate the net income earned by the employee assuming that the first Sh.24,000 is not taxed and that a personal relief of Sh.2,400 is allowed.
A. Sh.28,200
B. Sh.30,600
C. Sh.54,600
D. Sh.57,000 (2 marks)

In an examination given to a class of 5 students the following test scores were obtained:
40, 55, 60, 75 and 80

Use the data to answer Question 41 and Question 42

41. Calculate the standard deviation for the test scores.
    A. 6.32
    B. 3.79
    C. 14.35
    D. 206 (2 marks)

42. Determine the coefficient of variation for the test scores.
    A. 10.19%
    B. 23.14%
    C. 30.10%
    D. 43.2% (2 marks)

The frequency distribution of wages paid to workers in a certain tea processing factory is given in the table below:

Wages Sh. "000"	**Number of workers**
10 – 20	30
20 – 30	45
30 – 40	35
40 – 50	40

Use the data to answer Question 43 to Question 45

43. Calculate the arithmetic mean for the data
    A. Sh.25,000
    B. Sh.35,000
    C. Sh.30,667
    D. Sh.40,667 (2 marks)

44. Calculate the modal wage
    A. Sh.20,000
    B. Sh.26,000
    C. Sh.30,000
    D. Sh.50,000 (2 marks)

45. Calculate the median wage
    A. Sh.25,000
    B. Sh.30,000
    C. Sh.35,000
    D. Sh.75,000 (2 marks)

There are 30 auditors working for Charles and Shah Associates. Of these auditors, 20 are male. 40% of the male employees and 30% of the female employees in the organisation are graduates. An employee is selected at random.

Use the above information to answer Question 46 and Question 47

46. What is the probability that the employee selected is male and a graduate?
    A. $^{8}/_{11}$
    B. $^{8}/_{20}$
    C. $^{8}/_{30}$
    D. $^{8}/_{10}$ (2 marks)

47. What is the probability that the employee selected is female and **NOT** a graduate?

A. $^{7}/_{19}$

B. $^{7}/_{10}$

C. $^{7}/_{30}$

D. $^{10}/_{30}$ (2 marks)

Use the information below to answer Question 48 to Question 50

A box contains 10 sets of batteries, 6 of which are double A size while the rest are tripple A size. 2 sets of batteries are picked at random one after another without replacement.

Find the following probability:

48. Both are tripple A size

A. $^{11}/_{15}$

B. $^{16}/_{100}$

C. $^{16}/_{90}$

D. $^{12}/_{90}$ (2 marks)

49. Atleast one is double A size

A. $^{78}/_{90}$

B. $^{48}/_{90}$

C. $^{30}/_{90}$

D. $^{24}/_{90}$ (2 marks)

50. One is double A size and the other is tripple A size

A. $^{24}/_{90}$

B. $^{48}/_{90}$

C. $^{48}/_{100}$

D. $^{30}/_{90}$ (2 marks)

……

CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 25 April 2023. Afternoon Paper. **Time Allowed: 2 hours.**

This paper is made up of fifty (50) Multiple Choice Questions. Answer ALL questions by indicating the letter (A, B, C or D) that represents the correct answer. Each question is allocated two (2) marks. Do NOT write anything on this paper.

1. If two events A and B are collectively exhaustive, then A is the _____ of B.
   A. Compliment
   B. Conditional probability
   C. Inverse
   D. Reciprocal (2 marks)

2. If a six-sided dice is rolled, what is the probability that the outcome is 5?
   A. 1/6
   B. 1/5
   C. 5/6
   D. 1/2 (2 marks)

3. If a six-sided dice is rolled, what is the probability that the outcome is 5 or 2?
   A. 5/6
   B. 1/6
   C. 1/3
   D. 1/2 (2 marks)

4. Consider a deck of 52 playing cards. If we draw a card at random, the probability that it is a king is 4/52. Similarly, there is a probability of $^{13}/_{52}$ that it is spades and a probability $^{1}/_{52}$ that it is king and spades. What is the probability that it is king or spades?
   A. 16/52
   B. 1/52
   C. 17/52
   D. 1/2704 (2 marks)

5. Given the probability P(E) of event E is ⅓. What is the probability of its compliment E^C?
   A. 1
   B. 2/3
   C. 1/3
   D. $^{2}/_{9}$ (2 marks)

6. Which one of the following is **NOT** an advantage of the mode?
   A. Easy to compute and understand
   B. Least affected by extreme values
   C. It is rigidly defined
   D. It is based on all values (2 marks)

7. _____ is data that is collected by the researcher himself.
   A. Continuous data
   B. Discrete data
   C. Primary data
   D. Secondary data (2 marks)

8. A method of data collection where all items in the population are investigated is referred to as _____.
   A. Census
   B. Probability sample
   C. Random sample
   D. Strata (2 marks)

9. The data below shows the weight in kilograms of new students admitted in a school:

   50, 45, 60, 41, 54, 70, 80.

   Determine the median weight of the students.
   A. 41
   B. 54
   C. 60
   D. 80 (2 marks)

Use the data below to answer question 10 to question 12.

The number of off days taken by employees in a company in March 2023 is given in the table below:

Number of off days taken	Number of employees
0	41
1	43
2	29
3	18
4	11
5	2

10. Calculate the mean number of off days taken.
    A. 1.45
    B. 2
    C. 2.5
    D. 3 (2 marks)

11. Calculate the standard deviation of off days taken.
    A. 1.30
    B. 1.69
    C. 2
    D. 5
    (2 marks)

12. Calculate the median number of off days taken:
    A. 1
    B. 2
    C. 2.5
    D. 3 (2 marks)

13. The probability of two or more events happening together is referred to as?
    A. Conditional probability
    B. Joint probability
    C. Marginal probability
    D. Mutually exclusive (2 marks)

14. Which of the following is not a method of obtaining primary data?
    A. Records
    B. Interview
    C. Observation
    D. Questionnaire (2 marks)

15. Which one of the following is not a categorical variable?
    A. Hair colour
    B. Make of computer
    C. Gender
    D. Number of children (2 marks)

16. In the content of a stem and leaf representation, the observation 436, the stem is _____.
    A. 4
    B. 6
    C. 43
    D. 436 (2 marks)

17. Which one of the following is true about matrix operations?
    A. $AB = BA$
    B. $A^{-1}.A = A^{-1}$
    C. $A.A^{-1} = A$
    D. $A.I = A$ (2 marks)

18. The difference between the cost of goods sold and the selling price is called_____.
    A. Bonus
    B. Discount
    C. Mark-up
    D. Premium (2 marks)

19. A machine depreciated in value each year at the rate of 10% of its value at the beginning of a year. The machine was purchased for Sh.10,000. Obtain its value at the end of the 10^{th} year.
    A. 1,000
    B. 3,487
    C. 3,874
    D. 9,000 (2 marks)

20. Round off the following figure to three decimal places 34.99949.
    A. 34.000
    B. 34.999
    C. 35.000
    D. 35.999 (2 marks)

21. Convert 1.8% to decimal.
    A. 0.0018
    B. 0.018
    C. 0.18
    D. 1.80 (2 marks)

22. Convert 3.56 to percentage.
    A. 0.0356%
    B. 3.56%
    C. 35.6%
    D. 356% (2 marks)

23. Change 30/80 to percent.
    A. 0.375%
    B. 3.75%
    C. 37.5%
    D. 375% (2 marks)

24. A solution contains 200 grams of ingredient A and 40 grams of ingredient B. What percent of the solution is A?
    A. 16⅔%
    B. 20%
    C. 80%
    D. 83⅓% (2 marks)

Use the data below to answer questions 25 and 26.

Assume that the following rates of tax applied throughout the year of income 2022.

Monthly taxable pay (Sh.)	**Rate of tax (% in each Sh.)**
1 – 24,000	10
24,001 – 32,333	25
Excess over 32,333	30

Monthly personal relief provided was Sh.2,400.

25. Calculate the net pay-as-you-earn (PAYE) to Alex Omollo who earned a gross salary of Sh.35,000 in the month of January 2023.
    A. 2,883.35
    B. 5,283.55
    C. 8,100
    D. 10,500 (2 marks)

26. Calculate the net pay to Alex Omollo if in addition to PAYE he contributed Sh.200 and Sh.1,300 to national social security fund (NSSF) and national hospital insurance fund (NHIF) respectively.
    A. 23,000
    B. 25,400
    C. 28,216.45
    D. 30,616.65 (2 marks)

Use the data below to answer question 27 and question 28.

A tourist left Switzerland with Swiss Franc 4,500. He paid Swiss Franc 500 for his flight to Kenya. Upon arrival, he converted the balance into Kenya Shillings at a rate of 1 Swiss Franc = Ksh.90 and paid a commission of 1% to a Kenyan agent.

27. Calculate the total commission paid to the Kenyan agent in Kenya Shillings.
    A. KSh.40
    B. KSh.45
    C. KSh.3,600
    D. KSh.4,050
    (2 marks)

28. Determine the total amount the tourist received after commission in Kenya Shillings.
    A. KSh.356,400
    B. KSh.360,000
    C. KSh.400,950
    D. KSh.405,000
    (2 marks)

29. The price of television set inclusive of a 16% VAT is Sh.46,400. Calculate the price before tax.
    A. Sh.7,424
    B. Sh.38,976
    C. Sh.40,000
    D. Sh.53,824 (2 marks)

30. Find the inverse of the following matrix.

$X = \begin{pmatrix} 4 & 6 \\ 2 & 5 \end{pmatrix}$

A. $\frac{1}{8}\begin{pmatrix} 5 & 6 \\ -2 & 4 \end{pmatrix}$

B. $-\frac{1}{8}\begin{pmatrix} 5 & -6 \\ -2 & 4 \end{pmatrix}$

C. $\frac{1}{8}\begin{pmatrix} 5 & -6 \\ -2 & 4 \end{pmatrix}$

D. $\frac{1}{8}\begin{pmatrix} 4 & -6 \\ -2 & 5 \end{pmatrix}$ (2 marks)

31. What type of a matrix is $C = \begin{pmatrix} 5 & 0 & 0 \\ 0 & 6 & 0 \\ 0 & 0 & 5 \end{pmatrix}$

A. Diagonal matrix
B. Identity matrix
C. Null matrix
D. Scalar matrix (2 marks)

32. Determine the value of K given that 3, 15, 75, K and 1,875 are in proportion.

A. 5
B. 10
C. 15
D. 375 (2 marks)

33. Integrate the following function $2K^3 + 4K$.

A. $0.5K^4 + 2K^2 + C$
B. $0.5K^4 + 4K^2 + C$
C. $0.5K^4 + 3K^2 + C$
D. $K^4 + 2K^2 + C$ (2 marks)

34. Differentiate the following function.

$Y = -2x^2 + 3x - 4$

A. $\frac{dy}{dx} = -2x + 3x + 4$
B. $\frac{dy}{dx} = -4x + 3$
C. $\frac{dy}{dx} = -4x + 3x$
D. $\frac{dy}{dx} = 12$ (2 marks)

35. Solve the equation: $20 + \frac{4x}{20} = \frac{28}{40}$

A. –103.5
B. –96.5
C. 96.5
D. 103.5 (2 marks)

36. Solve the inequality: $2(x+3) > \frac{x}{2}$

A. $X < -4$
B. $X < 4$
C. $X > -4$
D. $X > 4$ (2 marks)

37. Find the value of the following definite integral

$$\int_{2}^{5} 4x \,.\, dx$$

A. 8
B. 12
C. 42
D. 50 (2 marks)

38. Find the output X that will maximise the profit P for the function P = $800x - x^2$
A. 20
B. 28
C. 400
D. 800 (2 marks)

39. Find the maximum revenue for the revenue function R = $600x - 2x^2$.
A. 0
B. 150
C. 300
D. 45,000 (2 marks)

40. Find the equation of a straight line with a slope (M) $-\frac{1}{3}$ and passing through point Z (–1, –2).
A. $x + 3y = -7$
B. $-x - \frac{1}{3}y = -2$
C. $-\frac{1}{3}x + y = -2$
D. $-x + 3y = 7$ (2 marks)

41. If a linear function goes through the points X = 2, Y = 5 and X = 3, Y = 7.
Specify the equation of the straight line.
A. $2x + y = 1$
B. $-2x + y = -1$
C. $-2x + y = 1$
D. $-x + y = 2$ (2 marks)

42. Simplify the following expression.
$6x(2 + 3x) - 2(9x^2 - 5x) - 484 = 0$

A. –22
B. –242
C. 22
D. 242 (2 marks)

43. The order of matrix B is (1 x 3) and that of C is (3 x 5).
Find the order of matrix BC.
A. 3 x 3
B. 5 x 1
C. 3 x 5
D. 1 x 5 (2 marks)

44. A vendor bought a power bank for Sh.3,500. He intends to make a profit mark up of 20%. Calculate the selling price of the power bank.
A. Sh.700
B. Sh.2,800
C. Sh.4,200
D. Sh.4,375 (2 marks)

45. If an item bought for Sh.575 is sold at a 20% net profit margin, find the selling price of the item.
A. Sh.115
B. Sh.143.75
C. Sh.690
D. Sh.718.75 (2 marks)

46. Njeri paid Sh.720 for a dress after the seller offered her a 10% cash discount. Calculate the marked price of the dress.
A. Sh.640
B. Sh.800
C. Sh.880
D. Sh.900 (2 marks)

47. Find the compound interest for an investment of Sh.4,000 at 6% interest compounded semi-annually for 10 years.
A. Sh.1,376
B. Sh.3,224
C. Sh.5,376
D. Sh.7,224 (2 marks)

48. Ken Mwamba is planning to buy a car worth Sh.680,000 in 3 years time. The bank offers a compound interest rate of 14% per annum. Determine the principal amount that Ken Mwamba should deposit in order to reach his target
A. Sh.221,019.37
B. Sh.304,567
C. Sh.458,980.63
D. Sh.500,000 (2 marks)

49. Ali Muli bought a Pick-up for Sh.1,200,000. The Pick-up is expected to depreciate at the rate of 10% per annum on a straight line basis. Calculate the value of the Pick-up after 3 years.
A. Sh.120,000
B. Sh.360,000
C. Sh.840,000
D. Sh.1,080,000 (2 marks)

50. A sum of money invested at a compound interest amounted to Sh.21,632 at the end of the second year and Sh.22,497.28 at the end of the third year. Find the rate of interest.
A. 0.96%
B. 1.04%
C. 1.96%
D. 4% (2 marks)

……

CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 6 December 2022. Afternoon Paper. **Time Allowed: 2 hours.**

This paper is made up of fifty (50) Multiple Choice Questions. Answer ALL questions by indicating the letter (A, B, C or D) that represents the correct answer. Do NOT write anything on this paper.

1. Round off 562 to the nearest number of hundreds.
   A. 500
   B. 550
   C. 560
   D. 600 (2 marks)

2. Round off 23.89543 to two decimal places.
   A. 23.00
   B. 23.89
   C. 23.90
   D. 23.91 (2 marks)

3. What type of fraction is $10^{3}/_{7}$?
   A. Improper fraction
   B. Mixed fraction
   C. Proper fraction
   D. Whole number (2 marks)

4. Convert $5^{5}/_{8}$ into a percentage?
   A. 62.5%
   B. 500%
   C. 562.5%
   D. 600% (2 marks)

5. A construction company hired 40 workers to construct and complete a project in 200 days. However, due to heavy rains there was a delay of 40 days in starting the work. Determine the number of extra workers to be hired in order to complete the work on time after the delay.
   A. 8
   B. 10
   C. 160
   D. 200 (2 marks)

6. During drought, ⅕ of the animals in a certain village died and 1,200 were left. Determine the number of animals that died?
   A. 300
   B. 1,500
   C. 4,800
   D. 6,000 (2 marks)

7. Determine the value of $⅔ - ⅓ \div (⅔ + ⅕)$
   A. 5/13
   B. 11/30
   C. 11/39
   D. 5/6 (2 marks)

8. The common factor of $x^3 y^4$ and $x^3 y^2$ is:

A. $x^3 y^3$
B. $x^3 y^2$
C. $x^2 y^2$
D. $x^2 y^3$ (2 marks)

9. Solve the following simultaneous equations:

$x + 2y = 3$
$x - 2y = 11$

A. $x = 0, \quad y = 1.5$
B. $x = 7, \quad y = -2$
C. $x = -4, \quad y = 3.5$
D. $x = 3, \quad y = 0$ (2 marks)

10. Remove the brackets from $(4x - 1)(2x - 3)$

A. $8x^2 - 10x + 3$
B. $8x^2 - 14x + 3$
C. $8x^2 + 3$
D. $8x^2 - 14 + 3$ (2 marks)

11. Factorise $50x^2 - 20x + 2$.

A. $(10x + 2)(5x - 1)$
B. $(10x - 2)(5x + 1)$
C. $(10x + 2)(5x + 2)$
D. $(10x - 2)(5x - 1)$ (2 marks)

12. Find the value of $12z^2 - 18z + 21$ when $z = -5$.

A. –189
B. 189
C. 231
D. 411

(2 marks)

13. Solve the inequality $y - 4 < 2y + 5$.

A. $y > -9$
B. $y < -9$
C. $y > 9$
D. $y < 9$ (2 marks)

14. Differentiate the following function with respect to y:

$z = 4y^4 + y^3 + 0.5y^2 - 3y + 10$

A. $4y^3 + 3y^2 + y - 3$
B. $16y^4 + 3y^3 + 3y - 3$
C. $16y^3 + 3y^3 + y - 3$
D. $16y^3 + y^2 + y - 13$ (2 marks)

15. Differentiation is used to determine the_____ of a function.

A. y intercept
B. Gradient
C. Value
D. Range (2 marks)

16. Find the integral of $6x^2 - 10x + 15$.

A. $12x - 10x$
B. $2x^3 - 5x^2 + 15x + c$
C. $6x - 10$
D. $6x^3 - 10x^2 + 15x + c$ (2 marks)

17. Two matrices can be multiplied if and only if:
    A. The number of columns in the first matrix is equal to the number of rows in the second matrix
    B. They are of the same order
    C. The number of rows in the first matrix is equal to the number of columns in the second matrix
    D. Has equal number of rows and columns (2 marks)

18. A square matrix in which all elements in the principal diagonal are the same, but all other elements are zero is referred to as:
    A. Square matrix
    B. Diagonal matrix
    C. Null matrix
    D. Scalar matrix (2 marks)

19. Given that $A = \begin{pmatrix} 2 & 9 \\ 5 & x \end{pmatrix}$ $B = \begin{pmatrix} 1 & 8 \\ 6 & 3 \end{pmatrix}$ and $AB = \begin{pmatrix} 56 & 43 \\ 53 & 64 \end{pmatrix}$

    Find the value of x.

    A. 8
    B. 12
    C. 21.33
    D. 61 (2 marks)

20. Find the value of y given that $A = \begin{pmatrix} 4 & 5 \\ y & 11 \end{pmatrix}$ and $A^{-1} = \begin{pmatrix} -11 & 5 \\ 9 & -4 \end{pmatrix}$
    A. – 9
    B. – 5
    C. 5
    D. 9 (2 marks)

21. Convert a margin of 3/10 to a mark-up.
    A. $^{3}/_{13}$
    B. $^{3}/_{7}$
    C. $^{3}/_{5}$
    D. $^{7}/_{10}$ (2 marks)

22. Noah sells X watches at a total price of Sh.2,016,000. He makes a profit of 40% on cost price of all the watches. If the cost per watch is Sh.4,000, determine the number of watches that Noah sold.
    A. 202
    B. 302
    C. 360
    D. 504 (2 marks)

23. Bella bought a pick-up for Sh.2,000,000. The pick-up depreciated at the rate of 20% per annum on a straight line basis. It has a residual value of Sh.400,000. Calculate the value of the pick-up after 3 years.
    A. Sh.800,000
    B. Sh.960,000
    C. Sh.1,040,000
    D. Sh.1,200,000 (2 marks)

Use the information below to answer question 24 to 26.

Mr Mutie bought a machine for Sh.3,600,000. After using it for 150,000 hours, he can sell it for Sh.2,100,000.

24. What is the rate of depreciation of the machine per hour?
    A. Sh.10
    B. Sh.14
    C. Sh.24
    D. Sh.38 (2 marks)

25. What is the linear depreciation equation in terms of hours worked by the machine?
A. r = 2,100,000 – 10t
B. r = 3,600,000 – 24t
C. r = 3,600,000 – 10t
D. r = 3,600,000 – 14t (2 marks)

26. What is the book value of the machine after running for 240,000 hours?
A. Sh.240,000
B. Sh.1,200,000
C. Sh.2,400,000
D. Sh.3,360,000 (2 marks)

27. A business imported goods worth 123,500 US Dollars, the prevailing exchange rate was 1 US Dollar = Ksh.110.

Calculate the value of the goods in Kenya Shillings.
A. Ksh.12,350
B. Ksh.1,235,000
C. Ksh.1,358,500
D. Ksh.13,585,000 (2 marks)

28. John Kitavi bought a car from a Japanese friend for 5,640,000 Yen. Given that 100 Japanese Yen = 83 Kenya Shillings, determine the amount in Kenya Shillings that John Kitavi paid for the car.
A. Ksh.56,400
B. Ksh.67,952
C. Ksh.4,681,200
D. Ksh.6,795,181 (2 marks)

29. An employee earns a taxable income of Sh.80,000. If the rate of tax is 15% for the first Sh.20,000 and 25% for any amount above Sh.20,000, calculate his net income.
A. Sh.18,000
B. Sh.62,000
C. Sh.65,000
D. Sh.77,000 (2 marks)

30. An employee is paid Sh.250 per hour for a 40 hours week. He then earns overtime at time-and-a-half. During a certain week, his total weekly wage was Sh.13,000. How many hours of overtime did he work?
A. 4 hours
B. 8 hours
C. 12 hours
D. 44 hours (2 marks)

31.

Monthly taxable pay	**Rate of tax per month**
1 – 24,000	10%
24,000 – 32,333	25%
Excess over 32,333	30%

From the above table, compute the total tax payable by an employee earning Sh.56,000 in a month.
A. Sh.4,483.25
B. Sh.7,100.1
C. Sh.11,583.35
D. Sh.16,800 (2 marks)

32. A company pays its salesmen Sh.8,000 per month as basic pay plus a commission of X% on the gross sales monthly. In the month of November, one salesman earned Sh.298,460 after making gross sales of Sh.2,420,500. Determine the rate of commission as a percentage.
A. 0.12%
B. 0.13%
C. 12%
D. 13% (2 marks)

33. Grace borrowed a loan of Sh.1,200,000 at a compound interest rate of 8% per annum. Calculate the interest paid after 5 years.
    A. Sh.480,000
    B. Sh.563,193.69
    C. Sh.1,763,193.69
    D. Sh.2,963,193.69 (2 marks)

34. Simple interest is calculated based on_____.
    A. Accumulated interest
    B. The principal amount
    C. The principal amount plus accumulated interest
    D. The principal amount minus the accumulated interest (2 marks)

35. Mary Muinde invested Sh.55,000 for 18 months at a simple interest rate of 11.5% per annum. Find the maturity value of the principal.
    A. Sh.9,487.5
    B. Sh.64,487.5
    C. Sh.113,850
    D. Sh.168,850 (2 marks)

Use the following data to answer question 36 to 38.

The earnings per share (EPS) for 5 companies are tabulated below:

Company	Earnings per share (EPS) (Sh.)
A	2.5
B	4
C	2.5
D	3
E	3.25

36. What is the arithmetic mean earning per share?
    A. Sh.2.5
    B. Sh.3
    C. Sh.3.05
    D. Sh.3.25 (2 marks)

37. What is the median earning per share?
    A. Sh.2.5
    B. Sh.3
    C. Sh.3.25
    D. Sh.4 (2 marks)

38. Given that the standard deviation for the earning per share is 0.56. Calculate the percentage coefficient of variation.
    A. 17.2%
    B. 18.36%
    C. 18.61%
    D. 22.4% (2 marks)

39. Which of the following variables is discrete?
    A. Share price
    B. Shares sold
    C. Weight
    D. Volume (2 marks)

40. Which of the following tools can be used to estimate the mode of a distribution?
    A. Frequency
    B. Lorenz curve
    C. Pie chart
    D. Z - chart (2 marks)

41. The average squared deviation of the data points from their mean is known as:
    A. Coefficient of variation
    B. Mean deviation
    C. Standard deviation
    D. Variance (2 marks)

42. A variable which can assume at most a countable number of values is called?
    A. Continuous variable
    B. Discrete variable
    C. Integer
    D. Random variable (2 marks)

43. The probability of an event B occurring given that event A has already occurred is referred to as:
    A. Conditional probability
    B. Joint probability
    C. Marginal probability
    D. Simple probability (2 marks)

44. The total of all possible outcomes in an experiment is referred to as_____.
    A. Event
    B. Sample point
    C. Sample space
    D. Outcome (2 marks)

Use the data below to answer question 45 and 46.

A cross tabulation of students in a singing competition by gender and by singing voice is given below:

Voice / Gender	Soprano	Alto	Tenor
Male	155	145	95
Female	169	153	119

A student is selected at random, what is the probability that the student selected is:

45. Tenor or male
    A. $^{609}/_{836}$
    B. $^{95}/_{836}$
    C. $^{490}/_{836}$
    D. $^{514}/_{836}$ (2 marks)

46. An alto given that the student is male.
    A. $^{145}/_{395}$
    B. $^{145}/_{298}$
    C. $^{145}/_{836}$
    D. $^{693}/_{836}$ (2 marks)

47. The count of data points in a class divided by the total number of data points is called?
    A. Class mid-point
    B. Cumulative frequency
    C. Frequency
    D. Relative frequency (2 marks)

48. The probability rule for compliments is stated as:
    A. $P(\bar{A}) = P(A) - 1$
    B. $P(\bar{A}) = P(\bar{A}) + P(A)$
    C. $P(\bar{A}) = 1 - P(A)$
    D. $P(\bar{A}) = 1 + P(A)$ (2 marks)

49. Mary and John are operating a partnership business where they share profit or loss in the ratio of 5:7 respectively. If Mary earned Sh.200,000 from the partnership, calculate the total profit earned from the partnership.

A. Sh.117,000
B. Sh.280,000
C. Sh.480,000
D. Sh.672,000 (2 marks)

50. An investor wishes to have an amount of Sh.440,000 on maturity in 30 months' time. He can invest his money at a simple interest rate of 8.5% per annum. How much money should he invest now in order to achieve his aim?

A. Sh.16,603.77
B. Sh.17,254.90
C. Sh.140,800
D. Sh.362.886.60 (2 marks)

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CAMS LEVEL I

PILOT PAPER

FUNDAMENTALS OF BUSINESS MATHEMATICS

November 2021. **Time allowed: Two hours**

This paper has three sections. Section One has forty (40) multiple choice questions. Section Two has twenty (20) short response/computational questions. Section Three has one (1) computational question. All questions are compulsory. The marks allocated to each question are shown at the end of the question.

SECTION ONE

[40 MARKS] [40 MINUTES]

1. Which is the best definition of probability? (1 mark)
   A. Measure of happenings
   B. Measure of Numbers
   C. Fraction of happening
   D. Measure of likelihood.

2. Which of the following is not a ratio? (1 mark)
   A. 4.333
   B. 2.847847
   C. 5/4
   D. 2.115713287.

3. Which of the following is an algebraic expression? (1 mark)
   A. x = 3y x 1
   B. h + 2m – 3a
   C. 5/2
   D. 4.

4. Which of the following expression best describe calculus? (1 mark)
   A. Study of rates.
   B. Study of rate of change.
   C. Study of variables
   D. Study of changes.

5. Select the equivalent of 4,000 km from the following: (1 mark)
   A. 400,000,000 cm
   B. 0.0004 cm
   C. 40,000 cm
   D. 4.0×10^9 cm.

6. Select a measure of dispersion from the following: (1 mark)
   A. Mean.
   B. Mode.
   C. Range.
   D. Pie chart.

7. Which of the following is equivalent to the ratio: (1 mark)

1/10: 3/10: 4/10: 2/10?

A. 2:7:8:4
B. 1:5:4:2
C. 3:9:12:6
D. 2:5:4:2

8. With regard to matrices, which of the following best describes a property of matrices: (1 mark)
A. AXB = BXA
B. A+B = B+A
C. AXBXC = AXCXB
D. hAB = Hba.

9. Select one of the statements below that best describes mutually exclusive events: (1 mark)
A. Happen at the same time
B. Happen at different times
C. Happening of one excludes happening of the other
D. None of the above.

10. In your opinion, which of the following best represents the income equation: (1 mark)
A. Total Cost – Total Revenue = Income
B. Fixed Costs – Total Revenue = Income
C. Total Revenue – Variable Costs = Income
D. Total Revenue – Total Cost = Income.

11. Name the term used to decide the percentage of profit on sales: (1 mark)
A. Mark-up
B. Gross margin
C. Sales margin
D. Net margin.

12. What indicates boundary points of inequalities of the form: (1 mark)
x>a, or x<b on the number line?
A. Has no effect
B. Doubles the values
C. Changes the sign to its opposite
D. Changes the inequality to an equation.

13. Indicate what best represents the effect of dividing an inequality by a negative number: (1 mark)

A. Has no effect
B. Doubles the values
C. Changes the sign to its opposite
D. Changes the inequality to an equation.

14. From the four expressions below, which one represents the gradient of a polynomial: (1 mark)

A. $\frac{dy}{dx} = x^{n-1}$

B. $\frac{dy}{dx} = (n+1)x^{n-1}$

C. $\frac{dy}{dx} = nx^{n-1}$

D. $\frac{dy}{dx} = \frac{x^{n+1}}{n+1}$

15. If events A and B are equiprobable, which of the following is correct: (1 mark)
A. $P(A) < P$
B. $P(A) > P(B)$
C. $P(A) + P(B) = 1$
D. $P(A) = P(B)$.

16. Which of the following tools is used to graphically evaluate the median of a distribution? (1 mark)
A. Cumulative frequency curve
B. Frequency polygon
C. Histogram
D. Stem and leaf diagram.

17. Select the number corrected to 4 significant figures from the following: (1 mark)
A. 52,734
B. 52,730
C. 0.85273
D. 0.5200

18. Which of the following represents 209/264 in its simplest form? (1 mark)
A. 109/264
B. 19/24
C. 19/25
D. 21/24.

19. In any football match. Three outcomes are possible: (1 mark)

A win, a draw or a loss. Given that a win is P(W), a draw P(D) and a loss is P(L).

Which of the following describes the sum of the three: (1 mark)
A. Equiprobable events
B. Conditional events
C. Impossible events
D. Collectively exhaustive events.

20. Which of the following best defines a singular matrix: (1 mark)
A. It's determinant = 1
B. It's determinant + Infinity
C. It's determinant = 0
D. It's determinant < 0

21. Identify the condition that defines a stationary point from the following: (1 mark)
A. $\frac{dy}{dx} = 0$
B. $\frac{dx}{dy} = 0$
C. $\frac{d^2y}{dx^2} = 0$
D. $\frac{dy}{dx} = 1$

22. Identify the type of discount that relates to purchases made in bulk from the following: (1 mark)
A. Cash discount
B. Trade discount
C. Loss discount
D. None of the above.

23. Identify the formula for compound interest from the following: (1 marks)

A. $I = \frac{PxRxT}{100}$

B. $I = \frac{PxRxT}{100} - 100$

C. $P(1 + r)n - P = I$

D. $I = P \times R$

24. Given that the average exchange rate in 2019 was I USD = KES 101.3899, what was the equivalent of KES540 in dollars? (1 mark)

A. 5.032
B. 0.5325
C. 5.326
D. 53.25

25. What is the name given to total possibilities that can happen in a coin tossing experiment? (1 mark)

A. Outcome
B. Sample space
C. Event
D. Tree diagram.

26. Your performance in this examination has no relationship with the performance of a student in Zambia sitting the same examination. Name this type of events: (1 mark)

A. Dependent events
B. Independent events
C. Conditional events
D. Similar events.

27. Which of the following measures of dispersion is the square-root of variance? (1 mark)

A. Standard deviation
B. Mean absolute deviation
C. Mean deviation
D. Mean squared deviation.

28. Which of the following relations represent a symmetrical distribution? (1 mark)

A. Mean < Median < Mode
B. Mean > Median > Mode
C. Mean < Median = Mode
D. Mean = Median = Mode.

29. Identify a depreciation method which charges higher depreciation amounts in the initial years and lower amounts in later years progressively. (1 mark)

A. Declining balance method
B. Straight line method
C. Revaluation method
D. None of the above.

30. Select a non-statutory deduction from the following: (1 mark)

A. NSSF
B. Bank loan
C. NHIF
D. Income tax.

31. What is the main distinction between fixed and variable costs? (1 mark)

A. Fixed costs remain fixed with increase in output.
B. Variable costs vary according to period length to which they relate.
C. Fixed costs are also variable costs in the long run.
D. Fixed costs and variable costs are the same.

32. In computing a mark-up, what is the denominator? (1 mark)
A. Total sales
B. Total expenses
C. Total cost
D. Net profit.

33. Given a matrix of the form A = $\begin{pmatrix} a & b, \\ c & d \end{pmatrix}$ which of the following expressions represents the determinant of A?
A. bc – ad
B. ab – cd
C. ac – bd
D. ad – bc (1 mark)

34. The number line contains natural numbers N, Whole numbers W, Rational number Q and Irrational number Q^c. Identify a natural number from the following: (1 mark)
A. 2.1
B. 2/5
C. –7/15
D. 4

35. What is the shape formed by the area between equations y = 3x + 5 and y = 3x + 9 from x = 0 to x = 5
A. Trapezium
B. Pararellogram
C. Circle
D. Square. (1 mark)

36. Which of the following terms describes the rate of change? (1 mark)
A. $\frac{dy}{dx}$
B. y
C. $\frac{d^2y}{dx^2}$
D. $\frac{d^3y}{dx^3}$

37. Simplify the term: $\frac{(x + 3y)(2x - 1)}{(1 - 2x)(3x + 9y)}$ (1 mark)
A. 2/3
B. 1/3
C. –1/3
D. –3

38. Which of the following is a method of solving simultaneous equations? (1 mark)
A. Matrix method
B. Factorisation
C. Expansion
D. Addition.

39. Which of the laws of probability applies when possibility of an event reduces? (1 mark)
A. Division law
B. Addition law
C. Subtraction law
D. Multiplication law.

40. What expression best represents the solution to the expression (2x)? (1 mark)
A. $x^2 + c$
B. $\frac{1}{2}x + c$
C. $x + c$
D. x^2

SECTION TWO

[40 MARKS] [1 Hour]

41. In your view, do you agree that substitution is one of the methods of solving a simultaneous equation? (2 marks)

42. Expand and simplify $2y(3x + 1) – 6yx + 9x$. (2 marks)

43. What is the name given to a value that represents a sample (usually calculated from a sample)? (2 marks)

44. Solve the following set of simultaneous equations:
$3x + ½y = 4$
$2y – 4x = 0$ (2 marks)

45. When Salim sells up to KES75,000 worth of sales, he receives 30% commission on sales. When he sells up to KES150,000, he receives 5% commission on sales. What is his sales commission when he sells KES120,000? (2 marks)

46. Five men can off-load a truck in 2 hours. How long will 8 men take to off-load the same truck? (2 marks)

47. Given that $3x + 2(5 – x) < 7$, solve for x. (2 marks)

48. Four exercise books and 3 pens cost KES255. What is the cost of 1 exercise book and 2 pens, given that 3 exercise books and 1 pen costs KES160? (2 marks)

49. Convert the fraction 5/9 into a percentage correct to 2 decimal places. (2 marks)

50. **Indicate whether this definition is true or false:**
Standard deviation is the square-root of mean squared deviations from mean. (2 marks)

51. Given that profit π of a firm is $\pi = 8 + q – q2$ where q, is the quantity sold in thousands, find q for maximum profit. (2 marks)

52. Write 3.4.5 as a fraction. (2 marks)

53. Given $A = \begin{pmatrix} 6 & 0 \\ -1 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & 7 \\ 8 & -1 \end{pmatrix}$
Find A + 2B (2 marks)

54. Ali Mohamed deposited KES200,000 in a bank that compounds interest half yearly. What interest accrued in 3 years? (2 marks)

55. Without graphing, how do you distinguish between a minimum stationary point from a maximum stationary point?

56. Work out the determinant of $A = \begin{pmatrix} 7 & -2 \\ 4 & 3 \end{pmatrix}$ (2 marks)

57. The book value of a machine depreciates to 90% of its value at the beginning of the year. What is its book value after 3 years in terms of its original value? (2 marks)

58. Use these five deviations to work out standard deviation 3, –1, –2, 1 –1 (2 marks)

59. What is plotted on the x – axis of a cumulative frequency curve? (2 marks)

60. What is the sum of year's digits method used for? (2 marks)

(Total: 20 marks)

SECTION THREE
[20 MARKS] [20 MINUTES]

61. Peta Limited produces product P and Q. At the current levels of production of 200 units of P and 250 units of Q, a sale of 2 units of P and 3 units of Q yields a profit of KES 7,500; while a sale of 1 unit of P and 2 units of Q yields a profit of KES4,400.

The profit functions for products P and Q are $\pi p = 2{,}400q - 3q^2$ and $\pi_Q = 1{,}800q - 2q^2$ respectively.

Required:

(a) Profit per unit of products P and Q at the current production levels of 200 units of P and 250 units of Q. (6 marks)

(b) Production level of products P and Q that yields maximum profit. (8 marks)

(c) Maximum profit at the production levels in (b) above for both products P and Q. (4 marks)

(d) Additional units to the current production level to attain the level that maximizes profit for both products P and Q. (2 marks)

(Total: 20 marks)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 2 August 2022. Afternoon paper **Time Allowed: 2 hours.**

This paper is made up of fifty (50) Multiple Choice Questions. Answer ALL questions by indicating the letter (A, B, C or D) that represents the correct answer. Do NOT write anything on this paper.

1. Find the value of;

$$\frac{x + y^2 + w(2x + y)}{2y - {}^1/_2xw}$$

If x = w-1, w = 4, y = w + x

A. 13
B. 10
C. 8
D. 14 (2 marks)

2. Simplify:
4(3x + 2y) – 3(2x – y)

A. 12x + 11y
B. 11x + 6y
C. 6x - 11y
D. 6x + 11y (2 marks)

3. A businessman borrowed Sh.3,200,000 from Inua bank at a simple interest rate of 14% per annum with a repayment period of 3 years. Calculate the total interest paid on the loan.

A. Sh.134,400
B. Sh.448,000
C. Sh.1,344,000
D. Sh.4,544,000 (2 marks)

4. James Mbugua bought a motor vehicle for Sh.4,500,000. The motor vehicle depreciates at the rate of 15% per annum. Calculate the net book value of the motor vehicle after six years using the straight line method.

A. Sh.4,050,000
B. Sh.450,000
C. Sh.675,000
D. Sh.750,000 (2 marks)

5. A factory hires 15 men to complete a piece of work in 24 days. How many more men are needed to complete the work in 10 days?

A. 21
B. 36
C. 12
D. 10 (2 marks)

6. The mean ages of six students is 30 years. The ages of five of the students are 25,37,32,27 and 34 years.
Find the modal age of the six students.

A. 25
B. 27
C. 34
D. 32 (2 marks)

7. The table below shows the size of shoes made in one week in a shop.

Shoe size	3	4	5	6	7	8	9
Sales made	21	12	18	5	6	3	1

Find the mean shoe size.

A. 4.6
B. 3.8
C. 9
D. 4 (2 marks)

8. There are 180 male students and 240 female students in Bidii College of Accountancy. Determine the ratio of male to female students as a fraction expressed in its simplest form.

A. $\frac{1}{4}$
B. $\frac{2}{3}$
C. $\frac{5}{8}$
D. $\frac{3}{4}$ (2 marks)

9. Increase 480 in the ratio of 6:5.

A. 563
B. 576
C. 400
D. 476 (2 marks)

10. The number of Covid-19 pandemic cases reported in the country decreased to 480 from 540 in the month of April 2022. What was the ratio decrease?

A. 4:7
B. 8:9
C. 9:8
D. 4:9 (2 marks)

11. Work out;

$$\frac{1\frac{1}{2} - \frac{1}{4} \times 1\frac{1}{3}}{\frac{1}{3} + \frac{1}{6} \div \frac{1}{2}}$$

A. $1\frac{1}{6}$
B. $1\frac{2}{3}$
C. $1\frac{3}{4}$
D. $\frac{7}{9}$ (2 marks)

12. In an agricultural show held in Kilimo farm ⅓ of the participants took orange juice, ⅗ of the remainder took apple juice while the rest took passion juice. What fraction took passion juice?

A. $\frac{1}{3}$
B. $\frac{2}{3}$
C. $\frac{4}{15}$
D. $\frac{2}{5}$ (2 marks)

13. Workout:

$$\frac{6.25 \times 4.8 \times 0.6}{0.25 \times 9.6 \times 0.2}$$

A. 3750
B. 37.5
C. 3.75
D. 18.75 (2 marks)

14. The price of a jacket was increased by Sh.400. If this was a 20% increase, what was the price of the jacket before the price increase.
A. Sh.2,400
B. Sh.1,800
C. Sh.1,600
D. Sh.2,000 (2 marks)

15. Duncan Maina is three times as old as his sister. Ten years ago, their total age was 24 years. How old will Duncan be in 3 years' time?
A. 36 years
B. 14 years
C. 11 years
D. 33 years (2 marks)

16. Mercy Mulwa bought a watch for Sh.342 after she was allowed a discount. If the marked price was Sh.360, what was the percentage discount?
A. 5%
B. 18%
C. 22%
D. $6^1/_9$% (2 marks)

17. The ratio of men to women in a meeting was 4:5. There are 70 more women than men in the meeting. How many women were there?
A. 350
B. 630
C. 280
D. 400 (2 marks)

18. After paying a commission of 7% of the price of a vehicle to an agent, the owner of the vehicle was left with Sh.232,500. How much was paid to the agent.
A. Sh.17,500
B. Sh.17,275
C. Sh.16,275
D. Sh.25,000 (2 marks)

19. Data that has been previously gathered and can be accessed by researchers is referred to as:
A. Primary data
B. Published data
C. Secondary data
D. Research (2 marks)

20. Stephen Yegon paid Sh.1,800 for an item after he was allowed a discount of 10%. How much was the marked price of the item.
A. Sh.2,000
B. Sh.1,980
C. Sh.1,620
D. Sh.2,180 (2 marks)

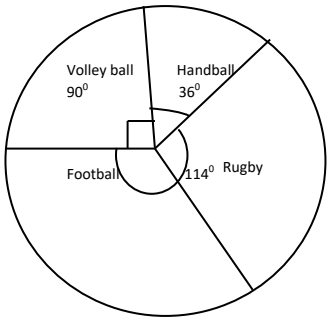
21. Simplify;
½ (2x – 14y – 6) + ¼ (8x + 36y + 12)

A. 3x + 2y - 6
B. 3x + 2y + 6
C. 3x + 2y
D. 3x + 16y + 6 (2 marks)

22. A man deposited Sh.60,000 in a bank account. After $2^1/_2$ years, he withdrew a total of Sh.68,250. At what rate per annum was the money earning the interest.
A. $5^1/_2$ %
B. 5%
C. 11.4%
D. $7^1/_2$% (2 marks)

23. Round off 499.9972 to the nearest hundredths.
A. 499.99
B. 499.00
C. 500.10
D. 500.00 (2 marks)

24. The pie chart below shows how students at Tumaini College chose their favourite sports:



If 18 students chose football, what is the total number of students taking sports?
A. 36
B. 48
C. 54
D. 60 (2 marks)

25. Grace, Alice and John are in a partnership business. They share profits in the ratio of 3:4:3. The partnership made a profit of Sh.1,540,000 in the financial year ended 30 June 2022. Calculate the share of profits received by Alice.
A. Sh.154,000
B. Sh.308,000
C. Sh.616,000
D. Sh.462,000 (2 marks)

26. Jane deposited Sh.700,000 in a fixed deposit account which offers a compound interest of 5% per annum. Calculate the amount received by Jane after the maturity period of 4 years.
A. Sh.850,854.38
B. Sh.150,854.38
C. Sh.140,000
D. Sh.840,000 (2 marks)

27. The incentive offered by a seller to the buyer to encourage bulk buying is referred to as?
A. Cash discount
B. Quantity discount
C. Special offer
D. Margin (2 marks)

28. Which of the following is not a measure of dispersion?
A. Variance
B. Range
C. Quartile deviation
D. Harmonic mean (2 marks)

29. Determine the median value of the following data:
12,15,22,30,18
A. 18
B. 15
C. 30
D. 22 (2 marks)

30. The data value with the highest frequency in a set of data is referred to as?
A. Mean
B. Median
C. Outlier
D. Mode (2 marks)

31. Which of the following is not a method of data collection?
    A. Questionnaire
    B. Sampling
    C. Observation
    D. Interview (2 marks)

32. Which of the following sampling methods is a probability method?
    A. Judgement
    B. Quota sampling
    C. Simple random sampling
    D. Convenience sampling (2 marks)

33. The graph obtained by joining the mid-points of the top horizontal parts of adjacent rectangles in a histogram is referred to as?
    A. Ogive
    B. Pie-chart
    C. Bar chart
    D. Frequency polygon (2 marks)

34. The difference between the upper and lower class boundaries of a class are known as?
    A. Class mid-point
    B. Class mark
    C. Class frequency
    D. Class interval (2 marks)

35. It two events are such that the occurrence or non-occurrence of one event affects the occurrence or non-occurrence of the other event, the two events are said to be?
    A. Mutually exclusive events
    B. Collectively exhaustive events
    C. Independent events
    D. Dependent events (2 marks)

36. The probability of two events happening together is referred to as?
    A. Joint probability
    B. Conditional probability
    C. Bayes theorem
    D. Marginal probability (2 marks)

37. Two events are said to be independent.
    A. If they cannot happen together
    B. If the occurrence or non-occurrence of one affects the occurrence or non-occurrence of the other.
    C. If the occurrence or non-occurrence of one does not affect the occurrence or non-occurrence of the other.
    D. If the occurrence of one event prevents the occurrence of the other event (2 marks)

38. There are 3 apples, 4 oranges and 6 mangoes in a shopping basket. What is the probability of picking a mango?

    A. $\frac{3}{13}$
    B. $\frac{4}{13}$
    C. $\frac{6}{13}$
    D. $\frac{4}{10}$ (2 marks)

39. Solve the following simultaneous equations;
$2x + 4y = 1$
$5x – y = 8$

A. $x = 1.5$, $y = -0.5$
B. $x = 1.5$, $y = 0.5$
C. $x = 0.5$, $y = -1.5$
D. $x = -1.5$, $y = -0.5$ (2 marks)

40. Differentiate the following equation with respect to x.

$Y = -3x^3 + 3x^2 - x + 20$

A. $\frac{\delta y}{\delta x} = -9x^3 + 6x - 1$
B. $\frac{\delta y}{\delta x} = -9x^2 + 6x - 1$
C. $\frac{\delta y}{\delta x} = -9x^2 + 6x - 21$
D. $\frac{\delta y}{\delta x} = -9x^2 + 6x$ (2 marks)

41. Profit expressed as a percentage of sales is referred to as?
A. Mark up
B. Margin
C. Gross profit
D. Net profit (2 marks)

42. Given the profit margin of an item is $^2/_7$, calculate the profit mark up.

A. $\frac{2}{3}$
B. $\frac{2}{9}$
C. $\frac{2}{5}$
D. $\frac{2}{7}$ (2 marks)

43. An employee earns a taxable income of Sh.30,000 per month. If the rate of tax is 12%, calculate the net income.
A. Sh.3,600
B. Sh.26,400
C. Sh.33,600
D. Sh.43,200 (2 marks)

44. A company pays its casual employees on an hourly rate of Sh.320 per hour. If Phillip Ochieng' worked for 42 hours in a certain week, calculate the gross pay.
A. Sh.14,000
B. Sh.67,200
C. Sh.13,440
D. Sh.94,080 (2 marks)

45. Robert Wambua purchased a book at Sh.375. He intends to make a profit mark up of 30% on sale of the book. Calculate his selling price.
A. Sh.112.50
B. Sh.262.50
C. Sh.461.54
D. Sh.487.50 (2 marks)

46. Round off the following number to three decimal places 29.99999999.
A. 30.999
B. 29.999
C. 30.000
D. 30.001 (2 marks)

47. Convert $^{5}/_{8}$ into a percentage.
A. 62.5%
B. 37%
C. 63%
D. 40% (2 marks)

48. Frequency tables is an arrangement of data by _____and their corresponding _____
A. Classes, frequencies
B. Frequencies, interval
C. Classes, categories
D. None of the above (2 marks)

49. The probability of a sure event is given by.
A. 0
B. 1
C. -1
D. ∞ (2 marks)

50. Given that A= $\begin{pmatrix} 5 & 6 \\ 9 & 10 \end{pmatrix}$ B = $\begin{pmatrix} 7 & 12 \\ 4 & 9 \end{pmatrix}$

Find A + B

A. $\begin{pmatrix} 7 & 12 \\ 4 & 9 \end{pmatrix}$

B. $\begin{pmatrix} 12 & 18 \\ 13 & 19 \end{pmatrix}$

C. $\begin{pmatrix} 12 & 10 \\ 13 & 19 \end{pmatrix}$

D. $\begin{pmatrix} 12 & 21 \\ 10 & 19 \end{pmatrix}$ (2 marks)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 5 April 2022. Afternoon paper **Time Allowed: 3 hours.**

This paper is made up of a hundred (100) Multiple Choice Questions. Answer ALL questions by indicating the letter (a, b, c or d) that represents the correct answer. Do NOT write anything on this paper.

1. Gloria Anyango spends 45% of her income to pay school fees for her children and 15% on rent. The rest of her income which amounts to Sh.45,000 is spent on food.
Determine the amount paid as school fees.
(a) Sh.16,875.
(b) Sh.112,500.
(c) Sh.33,750.
(d) Sh.50,625. (1 mark)

2. Express 0.084 as a percentage.
(a) 0.00084%.
(b) 8.4%
(c) 84%
(d) 0.84% (1 mark)

3. Calculate $66\ ^{2}/_{3}$ % of 1,200.
(a) 18
(b) 800
(c) 794.76
(d) 80,000 (1 mark)

4. A job is completed by 6 persons in 21 days. Determine the number of days 18 persons will take to complete the same task.
(a) 7 days.
(b) 5.1 days.
(c) 63 days.
(d) 126 days. (1 mark)

5. If the price of an article is increased by 25%, the new price is Sh.1,750.
Determine the original price before the price increase.
(a) Sh.2187.50
(b) Sh.1,400
(c) Sh.1,312.50
(d) Sh.1,725 (1 mark)

6. Convert 60% to a fraction?
(a) $\frac{2}{3}$
(b) $\frac{2}{5}$
(c) $\frac{3}{5}$
(d) $\frac{3}{10}$ (1 mark)

7. Anne, Ben and Carol are operating a partnership business. They share profits in the ratio of 3:5:2. In the year 2021, the partnership made a profit of Sh.2,560,000.
Calculate Anne's profit share.
(a) Sh.1,280,000
(b) Sh.768,000
(c) Sh.256,000
(d) Sh.1,024,000
(1 mark)

8. Round-off 34.478 to the nearest whole number.
(a) 34
(b) 35
(c) 34.5
(d) 36 (1 mark)

9. John Mativo leaves Sh.210,000 inheritance to his two sons, Alfred and Ben so that Ben gets $\frac{3}{4}$ of what Alfred gets. Calculate the amount received by Alfred?
(a) Sh.120,000
(b) Sh.157,500
(c) Sh.52,500
(d) Sh.90,000 (1 mark)

10. Which of the following is not a measure of central tendency?
(a) Mean
(b) Mode
(c) Absolute deviation
(d) Median (1 mark)

11. Which of the following is not a method of data collection?
(a) Interview
(b) Primary data
(c) Observation
(d) Questionnaire (1 mark)

12. Which of the following is a discrete data value?
(a) Number of cars
(b) Distance
(c) Length
(d) Weight (1 mark)

13. _____ is data that has already been collected.
(a) Secondary data
(b) Discrete data
(c) Primary data
(d) Published data (1 mark)

14. One of the disadvantages of observation method of data collection is that; _____
(a) Firsthand information is collected
(b) Lacks reliability
(c) Its time consuming
(d) It is not accurate (1 mark)

15. A sampling method in which all items in the population have an equal chance of being selected is referred to as?
(a) Probabilistic sampling
(b) Random sampling
(c) Census
(d) Stratified sampling (1 mark)

16. From the following data relating to ages of eight women at Faulu College, determine the medium age:
60, 48, 52, 72, 66, 41, 80, 38
(a) 72
(b) 52
(c) 56
(d) 66 (1 mark)

17. In a final examination in statistics, the mean score of a class of 50 students is found to be 65 marks with a standard deviation of 10 marks.

Determine the coefficient of variation.
(a) 15.38%
(b) 20%
(c) 6.5%
(d) 55% (1 mark)

18. From the following data sets, determine the modal value:
12, 14, 12, 16, 18, 16, 20, 18, 20, 14
(a) 20
(b) 16
(c) None
(d) All (1 mark)

19. In a ready to wear garment shop the most typical shirt size will be determined using?
(a) Arithmetic mean
(b) Mode
(c) Median
(d) Harmonic mean (1 mark)

20. The distribution of wages paid to foremen is given as follows:

Wages Sh."000"	10-20	20-30	30 and above
Frequency (f)	10	25	15

Calculate the mean wage paid to the foremen.
(a) Sh.24,500
(b) Sh.16,670
(c) Sh.26,000
(d) Sh.25,000 (1 mark)

21. Which one of the following measure of central tendency is not rigidly defined?
(a) Arithmetic mean
(b) Median
(c) Mode
(d) Geometric mean (1 mark)

22. A list of the entire population from which items can be selected to form a sample is called?
(a) Sampling frame
(b) Census
(c) Statistics
(d) Parameter (1 mark)

23. A sampling technique where every K^{th} item will be selected to be included in the sample is referred to as?
(a) Quota sampling
(b) Stratified sampling
(c) Multi-stage sampling
(d) Systematic sampling (1 mark)

24. Which name is given to a smoothed frequency polygon?
(a) Ogive curve
(b) Frequency curve
(c) Frequency histogram
(d) Relative frequency polygon (1 mark)

25. Which of the following statements is true about graphs?
(a) The independent variable should always be placed on the horizontal axis.
(b) The dependent variable should always be placed on the horizontal axis.
(c) The independent variable should always be placed on the vertical axis.
(d) None of the above. (1 mark)

26. A trader imported goods from Canada at a cost of 15,000 Canadian dollars. He paid freight charges and insurance in transit of 10% of the purchase value of the goods. He also paid Sh. 200,000 in import duty. Calculate the value of the goods in Shillings.
(1 Canadian Dollar = Sh. 89)
(a) Sh.1,668,500
(b) Sh.1,468,500
(c) Sh.16,500
(d) Sh.1,485,000 (1 mark)

27. A businessman offers a commission of Sh.200 for every sales worth Sh.2,300. Philip Ngeno made sales worth Sh.52,900. Calculate the total commission received by Philip Ngeno.
(a) Sh.2,300
(b) Sh.10,580,000
(c) Sh.460,000
(d) Sh.4,600 (1 mark)

28. An American tourist converted 8,600 dollars to Kenya Shillings at an exchange rate of Ksh.110 per United States dollar. Calculate the amount received by the tourist in Kenya shillings.
(a) Sh.946,000
(b) Sh. 78.18
(c) Sh. 100
(d) Sh. 100,000 (1 mark)

29. A business person imported a car from Japan at a cost of Kenya shillings 3,000,000. If the prevailing exchange rate was Ksh. 80 per Japanese Yen, calculate the cost of the car in Japanese Yen.
(a) Yen 320,000,000
(b) Yen 37,500
(c) Yen 6,400
(d) Yen 75,000 (1 mark)

30. A manufacturing company pays its workers Sh.1,200 for every unit produced. On a given day Thomas Korir produced 5 units. Calculate the amount paid to Thomas Korir.
(a) Sh.1,200
(b) Sh.6,000
(c) Sh.7,200
(d) Sh.3,600 (1 mark)

31. An employee earns a taxable income of Sh.80,000 per month. The tax rate is 15% per month. Calculate the net pay.
(a) Sh.12,000
(b) Sh.80,000
(c) Sh.68,000
(d) Sh.92,000 (1 mark)

32. Juma Barasa bought a piece of land for Sh.850,000. The land is expected to appreciate in value at the rate of 5% per annum. Calculate the value of the land after 3 years.
(a) Sh.127,500
(b) Sh.977,500
(c) Sh.722,500
(d) Sh.850,000 (1 mark)

33. A manufacturer bought a machine for Sh.250,000. The machine has a useful life of 8 years with no scrap value. Calculate the annual rate of depreciation for the machine.
(a) 10%
(b) 20%
(c) 25%
(d) 12.5% (1 mark)

34. Duncan Mulwa paid Sh.15,000 to purchase a bicycle after receiving a discount of 20%. What is the gross price of the bicycle?
(a) Sh.18,000
(b) Sh.75,000
(c) Sh.18,750
(d) Sh.12,000 (1 mark)

35. Samuel Mwangi bought an article for Sh.9,600 and later sold it at a loss of 20% of the selling price. Determine the selling price of the article.?
(a) Sh.7,680
(b) Sh.11,520
(c) Sh.11,200
(d) Sh.8,000 (1 mark)

36. James Olekina sells his products for Sh.30 per unit. He allows his customers a trade discount of 10% and a further cash discount of 7.5% for cash purchase. Cynthia Kwamboka buys 110 units, calculate the net amount paid by Cynthia Kwamboka.
(a) Sh.2,887.50
(b) Sh.2,747.25
(c) Sh.2,970
(d) Sh.3,059.50 (1 mark)

37. An allowance offered to buyers by sellers to encourage prompt payment is called?
(a) Trade discount
(b) Cash discount
(c) Quantity discount
(d) Prompt discount (1 mark)

38. Payment earned by an agent for selling on behalf of another person is called?
(a) Discount
(b) Basic pay
(c) Commission
(d) Profit (1 mark)

39. Sarah Kinyua bought a watch for Sh.1,200 and later sold it for Sh.800. Determine the percentage loss.
(a) $66^{2}/_{3}\%$
(b) 50%
(c) $33\ ^{1}/_{3}\%$
(d) 50%. (1 mark)

40. A trader gains 8% by selling a product for Sh.2,700. What did the product cost him?
(a) Sh.2,484
(b) Sh.2,500
(c) Sh.2,916
(d) Sh.216 (1 mark)

41. An article costing Sh.675 is sold at a profit margin of 25%. Find the selling price of the article.
(a) Sh.900
(b) Sh.168.75
(c) Sh.225
(d) Sh.843.75 (1 mark)

42. Given that mark-up of a product is $^{2}/_{3}$, determine the margin.
(a) 1
(b) $\frac{2}{5}$
(c) $\frac{3}{5}$
(d) $\frac{1}{3}$ (1 mark)

43. Matthew Tsofa deposited Sh.150,000 in a bank that paid a simple interest of 15% per annum for 2 years. Calculate the interest receivable after the 2 years.
(a) Sh. 45,000
(b) Sh.22,500
(c) Sh.195,000
(d) Sh. 105,000 (1 mark)

44. Compute the compound interest on Sh.20,000 at an interest rate of 8.5% for 2 years.
(a) Sh.23,544.50
(b) Sh.3.400
(c) Sh.3,544.50
(d) Sh.23,400 (1 mark)

45. Find the principal which amounts to Sh.68,000 at simple interest rate of 12% per annum in 3 years.
(a) Sh.59,840
(b) Sh.18,000
(c) Sh.188,889
(d) Sh.50,000 (1 mark)

46. Find the time in years it will take for a certain amount X invested at a compound rate of interest of 10% per annum to triple.
(a) 11.52 years
(b) 3 years
(c) 2.72 years
(d) 3.3 years (1 mark)

47. A father leaves an estate to be divided among his three sons Ali, Baba and Chacha. Ali gets $^{1}/_{3}$ of the estate, Babu gets $^{1}/_{4}$ while Chacha receives $^{1}/_{2}$ of the remainder. What is the total value of the estate if Chacha's share amounted to Sh.240,000.
(a) Sh.576,000
(b) Sh.1,000,000
(c) Sh.1,152,000
(d) Sh.411,429 (1 mark)

48. Determine the value of y given that 2,8 and 32, y are in proportion.
(a) 8
(b) 256
(c) 320
(d) 128 (1 mark)

49. The factorisation of $6x + 18y$ is.
(a) $3(2x + 6y)$
(b) $6(x + 9y)$
(c) $6(x + 3y)$
(d) $3(2x + 9y)$ (1 mark)

50. The factorisation of $6xy + 4x + 6 - 9x$ is.
(a) $(3x-2)(2y-3)$
(b) $(3x+2)(2y -3)$
(c) $(3x+2)(2y +3)4$
(d) $(3x-2)(2y +3)$ (1 mark)

51. A box contains 3 yellow balls and 5 green balls. 1 ball is selected at random from the box. What is the probability that the ball is yellow?

(a) $\frac{3}{5}$
(b) $\frac{5}{8}$
(c) $\frac{3}{8}$
(d) $\frac{2}{5}$

(1 mark)

52. Differentiate the following function: $Y=4x^3 + x^2 +6x+10$ with respect to x.

(a) $12x^2+2x+6$
(b) $4x^2+2x+6x$
(c) $12x^2+2x+6x$
(d) $12x^2+2x+16$

(1 mark)

53. Find the inverse of the following matrix;

$B= \begin{pmatrix} 4 & 2 \\ 0 & 1 \end{pmatrix}$

(a) $B^{-1} = \begin{pmatrix} 4 & -2 \\ 0 & 1 \end{pmatrix}$

(b) $B^{-1} = \begin{pmatrix} 1 & -2 \\ 0 & 4 \end{pmatrix}$

(c) $B^{-1} = \begin{pmatrix} 4 & 2 \\ 0 & 1 \end{pmatrix}$

(d) $B^{-1} = \begin{pmatrix} 0.25 & 0.5 \\ 0 & 1 \end{pmatrix}$

(1 mark)

54. Define the following notation as used in matrices; A^{-1}

(a) Inverse of a matrix
(b) Compliment of a matrix
(c) Equality of a matrix
(d) None of the above

(1 mark)

55. Two matrices can be added or subtracted if and only if_____

(a) They are of the same size.
(b) The number of columns in the first matrix is equal to the rows in the second matrix
(c) The number of rows in the first matrix is equal to the columns in the second matrix
(d) The number of columns in the second matrix is equal to the rows in the first matrix (1 mark)

56. If the probability of picking a blue pen from a pack is 0.25, how many pens are in the pack if there are 20 blue pens?

(a) 45
(b) 80
(c) 60
(d) 40

(1 mark)

57. A column vector matrix is a matrix which; _____

(a) Has no columns
(b) Has one row
(c) Has no rows
(d) Has one column

(1 mark)

58. A minima turning point has a gradient of; _____?
(a) 1
(b) ∞
(c) 0
(d) -1 (1 mark)

59. Which of the following is not a form of a turning point?
(a) Minima
(b) Point of infraction
(c) Maxima
(d) Gradient (1 mark)

60. Integrate the following function $4x^3$.
(a) $4x^4+ c$
(b) $4X^4$
(c) $X^4 + C$
(d) $12X^2$ (1 mark)

61. Convert a profit margin of 20% to markup.
(a) 40%
(b) 25%
(c) 10%
(d) 33.33% (1 mark)

62. How many terms are there in the expression $5xy^2+6x-4y+10$?
(a) 2
(b) 1
(c) 4
(d) 5 (1 mark)

63. The coefficient of $9x^3$ is?
(a) 3
(b) 27
(c) 6
(d) 9 (1 mark)

64. The value of $3x^2 - 2x + 3$ when x=3 is?
(a) 3
(b) 24
(c) 21
(d) -24 (1 mark)

65. The number – 10.36 lies on which side of the number line?
(a) Center
(b) Left
(c) Right
(d) Either side. (1 mark)

66. The number line for natural numbers _____.
(a) Extends indefinitely on both sides
(b) Extends indefinitely to the left from zero
(c) Extends indefinitely to the right from zero
(d) Lies between -1 and 1 (1 mark)

67. -10 is _____ than 10 and -12 is _____ than -8.
(a) Greater and greater
(b) Smaller and greater
(c) Smaller and smaller
(d) Greater and smaller. (1 mark)

68. Expand (x + 1) (x - 2).
(a) $x^2 - x + 2$
(b) $x^2 - x - 2$
(c) $x^2 + x - 2$
(d) $x^2 + x + 2$ (1 mark)

69. Factorise $x^2 - 5x + 6$.
(a) (x + 2) (x + 3)
(b) (x - 2) (x + 3)
(c) (x - 2) (x - 3)
(d) (x + 2) (x - 3) (1 mark)

70. Simplify (x + 6)2 + (2x -1)1
(a) 4x - 11
(b) 4x + 11
(c) 11
(d) 4x + 13 (1 mark)

71. If $y = \frac{3}{x^2}$ Find dy/dx
(a) $3x^2$
(b) $-6/x^3$
(c) $6x^{-3}$
(d) $6/x^3$ (1 mark)

72. The profit equation of a food processing plants described as Л=16x – $2x^2$ - 14 in Sh. "000". What is the initial cost of the project?
(a) Sh.0
(b) Sh.14,000
(c) Sh.16,000
(d) -Sh.2,000 (1 mark)

73. Find the derivative of $3/2\ x^2 - 1$.
(a) $9/2\ x^3 - 1x$
(b) 3x
(c) 3x - 1
(d) 3x – x (1 mark)

74. Find the range of values of x which satisfy the following inequality. -3x -4 > 2.
(a) x > -2
(b) $x > -2/3$
(c) x < -2
(d) $x < -2/3$ (1 mark)

75. Find the range of values of x which satisfy the following inequality $x/5 - x/4 > 2$.
(a) x < - 40
(b) x < 40
(c) x > - 40
(d) x > 40 (1 mark)

76. A quadratic equation can be solved using any of the following approaches except?
(a) Graphical approach
(b) By factorising
(c) By substitution method
(d) By completing the square method (1 mark)

77. The profit function of a certain production process is expressed as $y = 110q - q^2 - 1000$.
Determine the number of units required to maximize profit.
(a) 55 units
(b) 10 units
(c) 100 units
(d) 110 units (1 mark)

78. Solve the following simultaneous equations.
$12x + 8y = 48$
$16x - 12y = -4$
(a) $x = 4$
$y = 0$
(b) $x = 2$
$y = 3$
(c) $x = 3$
$y = 2$
(d) $x = 0$
$y = 6$ (1 mark)

79. A teacher is twice as old as his student. In twenty years time, he will be 1.5 times as old. What is the difference in their ages today?
(a) 10
(b) 40
(c) 20
(d) 30 (1 mark)

80. Determine the equation of the straight line which passes through points A (1,6) and B (2, 10).
(a) $y = 5.75 + 0.25x$
(b) $y = 2 + 4x$
(c) $y = 2 - 4x$
(d) $y = 4.4 + 1.6x$ (1 mark)

81. A worker is paid Sh.500 for each day he worked. A penalty of Sh.250 is imposed for each day the worker is absent. The worker was paid Sh.7,750 after 20 days. For how many days was he absent?
(a) 9
(b) 5
(c) 3
(d) 15 (1 mark)

82. A maximum turning point on a curve may be determined using?
(a) Integration
(b) Differentiation
(c) Quadratic Formula
(d) Factorisation (1 mark)

83. Given that $x = 3$ and $y = 2$.
Evaluate $x^2 - x^3y + 6$.
(a) - 45
(b) - 39
(c) - 51
(d) - 3 (1 mark)

84. A matrix B $\begin{pmatrix} 3 & 1 \\ 2 & y \end{pmatrix}$ is such that determinant is 1. Find out the value of y.

(a) $-\frac{1}{3}$
(b) 3
(c) 5
(d) 1 (1 mark)

85. Given that $A=\begin{pmatrix}1 & 6 & 2\\ 2 & 1 & 3\end{pmatrix}$ $B=\begin{pmatrix}1 & 0 & 0\\ 3 & 1 & 0\end{pmatrix}$ and $C=\begin{pmatrix}1 & 4\\ 2 & 5\end{pmatrix}$

Which of these matrices is compatible for multiplication?

(a) $B \times A$
(b) $B \times C$
(c) $A \times B$
(d) $C \times B$

(1 mark)

86. A matrix obtained by interchanging the rows and columns of a matrix is known as?
(a) Inverse of a matrix
(b) Transpose of a matrix
(c) Square matrix
(d) Diagonal matrix

(1 mark)

87. A square diagonal matrix with all elements in the primary diagonal being equal is called?
(a) A scalar
(b) Column vector
(c) Null matrix
(d) Row vector

(1 mark)

88. What is the probability of success if the probability of failure is 0.05?
(a) 0.45
(b) 0.50
(c) 0.95
(d) 1.05

(1 mark)

89. Which of the following is not a probability value?
(a) 0
(b) -1
(c) 0.456
(d) 1

(1 mark)

90. What is the probability of a sure event?
(a) 1
(b) 2
(c) 0
(d) ∞

(1 mark)

91. Two events are said to be independent if;
(a) The two events cannot happen together.
(b) The two event can happen together.
(c) The occurrence or non-occurrence of one event affects the occurrence or non-occurrence of the other.
(d) The occurrence or non-occurrence of one event does not affects the occurrence or non-occurrence of the other.

(1 mark)

92. Two events are said to be mutually exclusive if;.
(a) The two events cannot happen together.
(b) The two events can happen together.
(c) The occurrence or non-occurrence of one event affects the occurrence or non-occurrence of the other.
(d) The occurrence or non-occurrence of one event does not affect the occurrence or non-occurrence of the other.

(1 mark)

93. The probability of producing a defective unit by machine A is 0.15. If the machine produces 760 units, how many defective units will be produced?
(a) 646
(b) 15
(c) 85
(d) 114

(1 mark)

94. The number of units in a sample are referred to as.
(a) Outcomes
(b) Sample events
(c) Sample space
(d) Probability space (1 mark)

95. Under the additional rule of probability, the events must be _____.
(a) Dependent
(b) Equally likely
(c) Mutually exclusive
(d) Collectively exhaustive (1 mark)

96. Probability can assume any value between _____.
(a) 0 and 1
(b) -1 and 1
(c) 1 and 2
(d) -1 and 0 (1 mark)

97. The probability of an event A happening given that event B has already happened is referred to as?
(a) Joint probability
(b) Conditional probability
(c) Equally likely probability
(d) Impossible probability (1 mark)

98. Two events are said to be equally likely if; _____.
(a) They can happen together
(b) They have to occur
(c) They have the same probability of occurrence
(d) They cannot happen together. (1 mark)

99. Three unbiased coins are tossed simultaneously.
Find the sample space.
(a) 6
(b) 9
(c) 8
(d) 3 (1 mark)

100. A single possible outcome of an experiment is called?
(a) Simple event
(b) Compound event
(c) Equally likely event
(d) Mutually exclusive event (1 mark)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

THURSDAY: 16 December 2021. **Time Allowed: 3 hours.**

This paper has three sections. SECTION I has forty (40) multiple choice questions. SECTION II has twenty (20) short response/computational questions. SECTION III has one (1) computational question. All questions are compulsory. Marks allocated to each question are shown at the end of the question.

SECTION I - 40 MARKS

1. Which one of this is unaffected by outliers?
   (a) Mean
   (b) Mode
   (c) Standard deviation
   (d) Range (1 mark)

2. Since the mode is the most frequently occurring data value in the data distribution, it is:
   (a) Always equal to the mean
   (b) Larger than the mean
   (c) At least two
   (d) Always smaller than the median (1 mark)

3. The value of x if 3, 18 and x, 42 are in proportion is:
   (a) 6
   (b) 54
   (c) 7
   (d) 3 (1 mark)

4. Which of the following is true about probability?
   (a) The probability of an impossible event is 0
   (b) Probability can be greater than one
   (c) Probability can be less than zero
   (d) The probability of a sure event is 0 (1 mark)

5. The transpose of a row matrix is a:
   (a) Diagonal matrix
   (b) Zero matrix
   (c) Column matrix
   (d) Identity matrix (1 mark)

6. Which of the following is an inverse of matrix A?
   (a) A^{1}
   (b) A^{-1}
   (c) A^{C}
   (d) A (1 mark)

7. When we factorise an expression, we write it as a _____ of factors.
   (a) Sum
   (b) Difference
   (c) Product
   (d) Fraction (1 mark)

8. Which of the following describes the number on top of a fraction?
   (a) Number
   (b) Denominator
   (c) Numerator
   (d) Factor
   (1 mark)

9. What type of a fraction is $\frac{9}{7}$?
   (a) Proper fraction
   (b) Mixed number fraction
   (c) Like fraction
   (d) Improper fraction
   (1 mark)

10. Which of the following fractions is equivalent to $\frac{2}{5}$?
   (a) $\frac{4}{8}$
   (b) $\frac{5}{2}$
   (c) $\frac{4}{10}$
   (d) $\frac{3}{15}$
   (1 mark)

11. The data below shows marks scored by interviewees in an interview:
   54, 80, 65, 75, 96.

   Which is the median mark?
   (a) 65
   (b) 80
   (c) 74
   (d) 75
   (1 mark)

12. Mulwa, Mulei and Kingi earned Sh.50,000 in a joint venture business. If Mulwa's profit was 40% of the total, then his share in Sh. was:
   (a) 10,000
   (b) 15,000
   (c) 50,000
   (d) 20,000
   (1 mark)

13. Which one of the following is not a frequency curve?
   (a) Ogive
   (b) Pictogram
   (c) Histogram
   (d) Polygon
   (1 mark)

14. If two events A and B are mutually exclusive, then
   (a) They must be independent events
   (b) They cannot be compliments
   (c) They cannot happen together
   (d) They can happen together
   (1 mark)

15. Which one of the following is not a measure of central tendency?
   (a) Variance
   (b) Mode
   (c) Mean
   (d) Median
   (1 mark)

16. Round off 0.36985 to three decimal places.
(a) 0.369
(b) 0.378
(c) 0.370
(d) 0.37 (1 mark)

17. Convert a markup of $\frac{2}{5}$ to a margin.
(a) $\frac{2}{3}$
(b) $\frac{4}{5}$
(c) $\frac{2}{7}$
(d) $\frac{4}{7}$ (1 mark)

18. Matrix $\begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix}$ can be defined as:
(a) Identity matrix
(b) Scalar matrix
(c) Diagonal matrix
(d) Null matrix (1 mark)

19. Which of the following matrices has an inverse matrix?
(a) $\begin{bmatrix} 3 & 0 \\ 0 & 1 \end{bmatrix}$
(b) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
(c) $\begin{bmatrix} 2 & 2 \\ -2 & -2 \end{bmatrix}$
(d) $\begin{bmatrix} 3 & 4 \\ 0 & 0 \end{bmatrix}$ (1 mark)

20. A vendor bought an item for Sh.80 and later sold it at Sh.100. What was the profit margin as a percentage?
(a) 25%
(b) 20%
(c) 40%
(d) 10% (1 mark)

21. There are 7 green apples and 5 red apples in a basket. What is the probability of picking a red apple?
(a) $\frac{5}{7}$
(b) $\frac{5}{12}$
(c) $\frac{7}{5}$
(d) $\frac{7}{12}$ (1 mark)

22. In a box, there are 8 red, 7 white and 6 blue balls. If a ball is picked up at random, what is the probability that it is neither red nor blue.
(a) $\frac{1}{3}$
(b) $\frac{1}{2}$
(c) $\frac{2}{2}$
(d) $\frac{5}{21}$

32. In a class there are 20 boys and 15 girls. The ratio of boys to girls is:
(a) 3:3
(b) 3:4
(c) 4:5
(d) None of the above. (1 mark)

33. The probability of two events happening together is referred to as:
(a) Conditional probability
(b) Joint probability
(c) Sure probability
(d) Equivalent probability (1 mark)

34. You deposit Sh.2,500 today in an account that earns 4% per annum interest compounded quarterly. How much will you have at the end of 10 years?
(a) Sh.1,488.90
(b) Sh.3,700.60
(c) Sh.3,980.20
(d) Sh.3,722.20 (1 mark)

35. When 0.36 is written in simplest form, the sum of the numerator and denominator is:
(a) 12
(b) 23
(c) 34
(d) 45 (1 mark)

36. In a cumulative frequency polygon, frequencies are plotted on:
(a) Rectangles
(b) X-axis
(c) Y-axis
(d) None of the above (1 mark)

37. Calculate the simple interest earned in 9 months if a sum of Sh.1,640 is invested in a bank at a rate of interest of 4.5% per annum:
(a) Sh.36.90
(b) Sh.55.35
(c) Sh.73.80
(d) Sh.16.40 (1 mark)

38. Under the straight line method of providing depreciation, the cost of an item;
(a) Decreases every year
(b) Remains constant every year
(c) Increases every year
(d) None of the above (1 mark)

39. The probability of getting two tails when two coins are tossed is:
(a) $\frac{1}{6}$
(b) $\frac{1}{2}$
(c) $\frac{1}{3}$
(d) $\frac{1}{4}$ (1 mark)

40. Depreciation occurs due to:
(a) Losses
(b) Wear and tear
(c) Accident
(d) None of the above (1 mark)

32. In a class there are 20 boys and 15 girls. The ratio of boys to girls is:
(a) 3:3
(b) 3:4
(c) 4:5
(d) None of the above. (1 mark)

33. The probability of two events happening together is referred to as:
(a) Conditional probability
(b) Joint probability
(c) Sure probability
(d) Equivalent probability (1 mark)

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39. The probability of getting two tails when two coins are tossed is:
(a) $\frac{1}{6}$
(b) $\frac{1}{2}$
(c) $\frac{1}{3}$
(d) $\frac{1}{4}$ (1 mark)

40. Depreciation occurs due to:
(a) Losses
(b) Wear and tear
(c) Accident
(d) None of the above (1 mark)

SECTION II - 40 MARKS

41. Differentiate the following function.
$Y = -3x^4 + x^3 + x^2 + x$ (2 marks)

42. The data below shows the time taken in minutes by ten athletes to complete a race:
60, 50, 52, 38, 58, 34, 52, 57, 44

State the mode of the distribution. (2 marks)

43. Three business partners, Abel, Anitta and Angela share their profit in the ratio of 4:5:1.
If Angela received sh.25,000, what was the total profit earned. (2 marks)

44. Evaluate
$$\frac{-1(2+6) - 12 \div 5 + 5}{-2 \times 4 + -3x - 5}$$ (2 marks)

45. The cost of a car in Japan is 25,000 Japanese Yen.

Determine the cost of the car in Kenya shillings (Sh.) if 1 Japanese Yen = Kenya sh.127 (2 marks)

46. The number of female students in State college is 2,100. If the probability of selecting a female student at random from the college is $\frac{4}{7}$, calculate the number of male students in the college. (2 marks)

47. Grace bought a calculator at a cost of sh.600 and later sold it at sh.900

Calculate the profit markup on the sale of the calculator. (2 marks)

48. James bought a car at an initial cost of sh. 5,000,000. The car depreciates at the rate of 12% per annum on a straight line basis.

Required:
Find the net book value of the car after 4 years. (2 marks)

49. Convert $\frac{3}{8}$ to a percentage. (2 marks)

50. Round off 23.386521 to three decimal places. (2 marks)

51. Given 50, 64, 25, 76, calculate the arithmetic mean. (2 marks)

52. Dave deposited sh.80,000 in a fixed deposit account. After four years, the amount in the account was Sh.144,000.

Calculate the simple rate of interest. (2 marks)

53. Use indices to find the value of x.
$4^{(2x-3)} = 1,024$ (2 marks)

54. Integrate $4x^3 - 6x^2 + 8x - 5$ with respect to x. (2 marks)

55. Solve the following simultaneous equations.
$6x + 2y = 102$
$4x + 3y = 98$ (2 marks)

56. A manufacturer sold an item to a wholesaler at a 20% profit markup. The wholesaler sold the item to a retailer at Sh.3,600 at a 25% markup.

Calculate the cost of manufacturing the item. (2 marks)

57. Factorise; $12y^2 - 20y + 3$ (2 marks)

58. Expand; $(x + 4)(x - 2)$ (2 marks)

59. The marked price of a business mathematics book is sh. 800. The seller offers a cash discount of 5%. Determine the price of the book after the discount. (2 marks)

60. Solve the following equation $2^y \times 2^{y+2} = 16$ (2 marks)

SECTION III - 20 MARKS

61. The table below shows the profit earned by Small and Medium Size Enterprises (SMSEs) in Kenya.

Profit Sh.'million'	**Number of companies**
10 - 20	10
20 - 30	8
30 - 40	5
40 - 50	22
50 - 60	15
60 - 70	12
70 - 80	8

Required:

(i) The arithmetic mean profit. (5 marks)

(ii) The median profit. (5 marks)

(iii) The modal profit. (5 marks)

(iv) The standard deviation of the profit. (5 marks)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 31 August 2021. **Time Allowed: 3 hours.**

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

QUESTION ONE

(a) (i) John Thoya drove 343 kilometres on the first day of his trip. He intends to continue driving at the same speed.

Required:
The number of days that John Thoya will require to drive the remaining 1,200 kilometres. (3 marks)

(ii) Your next-door neighbour has spent 10 hours a week to landscape his ½ acre property. You are thinking about landscaping your ⅓ acre property in exactly the same way.

Required:
The number of hours a week that you will have to spend to landscape your property. (3 marks)

(b) (i) Express the fraction $\frac{2x + 6xy}{4x^2 + 10x^3}$ in its simplest form. (3 marks)

(ii) Express $\frac{1}{x+1} - \frac{1}{x-1}$ as a single fraction. (3 marks)

(c) (i) Jacob Otieno is the Assistant Manager of a clothing store. He earns Sh.35,000 per month. He also receives a 5% commission on the first Sh.900,000 sales and 6% on sales over Sh.900,000.

Required:
Jacob Otieno's total earnings if he sold Sh.1,700,000 worth of clothes in July 2021. (4 marks)

(ii) A trader buys a juice blender at Sh.18,000 and sells it through an agent after paying him a commission of 4% on the selling price.

Required:
The selling price of the juice blender assuming that the trader makes a net profit of 20% on cost. (4 marks)

(Total: 20 marks)

QUESTION TWO

(a) A del credere agent charges a 3% commission on cash sales and a 6% commission on credit sales. His average commission on total sales is 4.3%.

Required:
The ratio of cash sales to credit sales. (6 marks)

(b) A merchant employed an agent to buy and sell a certain product. The agent charged a commission of 3% on the purchase price and 2% on the sale price. The purchase price was Sh.40,000. After deducting the commissions, the merchant made a net profit of 19.5% on the purchase price.

Required:
The sale price of the product. (4 marks)

(c) A trader allows a trade discount of 8% on the list price of his goods and a further discount of 2% for cash payment and still makes a profit of 12.7% on the cost price.

Required:
The percentage mark-up on cost price. (5 marks)

(d) A, B and C are partners in a business and have contributed Sh.200,000, Sh.350,000 and Sh.450,000 respectively as capital. They share profits or losses in the ratio of capital contributed. At the end of the year, the partnership business made Sh.1,370,500 as profit.

Required:
The share of profit of each partner. (5 marks)
(Total: 20 marks)

QUESTION THREE

(a) Explain the following terms as used in probability:

(i) Dependent events. (2 marks)

(ii) Joint probability. (2 marks)

(iii) Mutually exclusive events. (2 marks)

(iv) Conditional probability. (2 marks)

(v) Independent events. (2 marks)

(b) Solve the following equations:

(i) $3^{4x-6} = 81$ (2 marks)

(ii) $3(2x - 3) = 2(x + 4)$ (2 marks)

(c) A motor vehicle costs Sh.1,250,000 and has a useful life of 6 years and a residual value of Sh.50,000. In the first 3 years, the motor vehicle was depreciated on a straight line basis and in the next 3 years using the reducing balance method.

Required:
The reducing balance annual rate of depreciation in the last 3 years given the same expected residual value. (6 marks)
(Total: 20 marks)

QUESTION FOUR

(a) James Nzila has received a lumpsum payment from his pension scheme. He has decided to gift 30% of the lumpsum payment to his wife, 20% to his son, 10% to his daughter, 50% of the remainder to his mother and the rest to his local church. His mother received Sh.100,000.

Required:
The amount received by each of the above beneficiaries. (6 marks)

(b) Differentiate the following functions:

(i) $Y = -4x^3 + x^2 + 6x + 30$ with respect to x. (3 marks)

(ii) $Z = 16y^{½} + ⅓y^3 + 6$ with respect to y. (3 marks)

(c) Solve the following simultaneous equations using the matrix method:

$105X + 224Y = 61,320$
$245X + 96Y = 40,680$

(8 marks)
(Total: 20 marks)

QUESTION FIVE

(a) Distinguish between "primary data" and "secondary data". (4 marks)

(b) Highlight two advantages and two disadvantages of the "arithmetic mean" as a measure of central tendency. (4 marks)

(c) The table below shows the distribution of profits made by 150 companies in a given country:

Profit Sh. "million"	**Number of companies**
5-10	10
10-15	18
15-20	20
20-25	30
25-30	18
30-35	12
35-40	20
40-45	12
45-50	8
50-55	2

Required:

(i) A "less than" and "more than" ogive for the above data. (10 marks)

(ii) Estimate the median profit from the ogives obtained in (c) (i) above. (2 marks)

(Total: 20 marks)

QUESTION SIX

(a) A businessman deposits Sh.1,500 in a bank account in the first month. He deposits into the account in every consecutive month an amount that increases by 20% of the initial amount deposited.

Required:

(i) The amount deposited during the 25^{th} month. (2 marks)

(ii) The total amount in the bank account at the end of the 48^{th} month. (4 marks)

(b) The following table summarises the marks scored by 220 students of a commercial college in a Business Statistics test:

Marks (%)	**Frequency**
11-20	2
21-30	20
31-40	32
41-50	36
51-60	58
61-70	46
71-80	20
81-90	6

Required:

(i) The mean mark. (2 marks)

(ii) The standard deviation of the marks scored. (4 marks)

(iii) The modal mark. (2 marks)

(c) A non-governmental organisation intends to select an employee from some 140 male and female applicants from County A and County B. The following table provides a summary of this information:

	Gender	
	Male	**Female**
County A	32	28
County B	44	36

Required:

(i) The probability that the selected person is from County A or a female. (3 marks)

(ii) The probability that the chosen person is male given that he is from County B. (3 marks)

(Total: 20 marks)

QUESTION SEVEN

(a) You are given the quadratic function $y = 4x^2 - 4x - 3$ for the domain $-2 \leq x \leq 3$.

Required:

(i) Draw the quadratic graph/curve of the function for the domain $-2 \leq x \leq 3$. (6 marks)

(ii) Using the results obtained in (a) (i) above, solve the equation $4x^2 - 4x - 3 = 0$ (2 marks)

(b) A Kenyan businessman imports 1,700 gold chains at a cost of US$ 180 each, 150 electronic gadgets at a cost of £75 each, and 950 machine parts at a cost of €67 each. He incurs a 5% customs duty on the cost of imports, Ksh.500,000 on freight and € 600 on insurance.

Required:

(i) The total cost of the consignment in Kenya Shillings (Ksh.) (3 marks)

(ii) The total profit in Euros (€) that the businessman earns if he sets a 10% markup on the cost of the gold chain, 15% markup on the cost of the electronic gadgets and 20% markup on the cost of the machine parts.

The following exchange rates are applicable:

1 US $ = Ksh.108
1 £ = Ksh.150
1 € = Ksh.128

(3 marks)

(c) Mr. Ismail Mwankale deposits Sh.850,000 in his bank account for 3 years where interest is paid at the rate of 12% per annum compounded quarterly. At the end of year 3, he withdraws Sh.240,000 from the account. He intends to buy a certain machine after another 2 years that will cost Sh.1,560,000.

Required:

The amount he should deposit in his bank account after 3 years to enable him buy the machine. (6 marks)

(Total: 20 marks)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 18 May 2021. **Time Allowed: 3 hours.**

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

QUESTION ONE

(a) The interior angles of a quadrilateral are in the ratio of 3:5:7:9.

Required:
The difference in size between the largest and the smallest interior angle. (3 marks)

(b) It takes 6 men 3 days to lay the foundation of a building of size $30m^2$. On one site, the men have to lay the foundation of a building of size $50m^2$ and this work needs to be completed in 2 days.

Required:
The number of men required to complete this work in 2 days. (3 marks)

(c) Divide Sh.370 into three parts such that the second part is ¼ of the third part and the ratio between the first and the third part is 3:5.

Calculate the value of each part. (5 marks)

(d) Prove algebraically that the recurring decimal $0.3\dot{1}\dot{8}$ can be written as $^{7}/_{22}$. (3 marks)

(e) A tank can be filled by tap A in 8 hours and by tap B in 10 hours. A third tap can empty the full tank in 9 hours.

Required:
The amount of time required to fill up the empty tank assuming that all the taps are turned on at the same time.
(6 marks)
(Total: 20 marks)

QUESTION TWO

(a) Simplify the following:

(i) $(24x^4y^2)^{1/3} \div (3xy^2)^{1/3}$. (3 marks)

(ii) $(2x^2y^{-3}z)^3 \times (x^{-3}y^6z^9)^{1/3} \div 16(x^4y^6z^2)^{1/2}$. (6 marks)

(b) Solve the following equations:

(i) $\text{Log}_4 x + \log_4 (x - 12) = 3$. (4 marks)

(ii) $\text{Log}_6 (x + 4) + \log_6 (x - 2) = \log_6 (4x)$. (4 marks)

(c) Evaluate $\log_9 564$. (3 marks)
(Total: 20 marks)

QUESTION THREE

(a) Solve the following equation:

$$\frac{4(x+2)}{5} = 7 + \frac{5x}{13}$$

(5 marks)

(b) Josephine Mukami bought a desktop computer and a printer at a total cost of Sh.220,350. The desktop computer cost 5½ times as much as the printer.

Required:

(i) The cost of a printer. (2 marks)

(ii) The cost of a desktop computer. (3 marks)

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

$$3x + 7y = 27$$
$$5x + 2y = 16$$

(6 marks)

(d) A car rental company charges a flat rate fee of Sh.3,000 and an additional Sh.25 per kilometre to rent a vehicle.

Required:

(i) Write a linear equation to approximate the total cost y (in shillings) per trip in terms of x (the number of kilometres driven). (1 mark)

(ii) The total cost of a 75-kilometre trip. (3 marks)

(Total: 20 marks)

QUESTION FOUR

(a) Given that $A = \begin{pmatrix} 1 & 4 & 2 \\ 3 & -1 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 5 \\ 2 & 0 \\ -1 & 3 \end{pmatrix}$,

find AB. (6 marks)

(b) Given that $C = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $D = \begin{pmatrix} 1 & 0 \\ 2 & -1 \end{pmatrix}$,

prove that $(CD)^T = D^T C^T$. (6 marks)

(c) Find the inverse of $P = \begin{pmatrix} 2 & 4 \\ 5 & -1 \end{pmatrix}$ and hence solve the following simultaneous equations:

$$2x + 4y = 1$$
$$5x - y = 8$$

(8 marks)

(Total: 20 marks)

QUESTION FIVE

(a) The share of a company is initially issued at the price of Sh.10 each. The value of this share grows by 25% every year.

Required:

(i) Show that the value of the share follows a geometric sequence. (2 marks)

(ii) Calculate the value of the share ten years after the initial public offering. (3 marks)

(iii) Plot a graph of the sequence of the value of the share over a period of 10 years after the share was issued. (9 marks)

(b) A sum of money invested at compound interest payable at the end of every year amounts to Sh.10,816 at the end of the second year and Sh.11,248.64 at the end of the third year.

Required:

(i) Calculate the rate of interest. (3 marks)

(ii) Calculate the amount of money invested initially. (3 marks)

(Total: 20 marks)

QUESTION SIX

(a) Differentiate the following functions with respect to x:

(i) $y = -2 + \frac{4}{5}x^5 - \frac{7}{8}x^8$ (3 marks)

(ii) $y = (x + 1)(2x^3 - 21)$. (5 marks)

(b) Evaluate the following integrals:

(i) $\int_1^2 \left(1 + \frac{2}{\sqrt{x}} + 3x\right) dx$. (5 marks)

(ii) $\int \left(\frac{2x^2 + x^2\sqrt{x} - 1}{x^2}\right) dx$. (3 marks)

(c) A bag contains 7 red, 12 white and 4 green balls.

Calculate the probability that 3 balls drawn at random are all white. (4 marks)

(Total: 20 Marks)

QUESTION SEVEN

The following table gives the distribution of the monthly wages of 600 workers of a factory:

Monthly wages **Sh."000"**	No. of workers
30 and under 37.5	69
37.5 " " 45.0	167
45.0 " " 52.5	207
52.5 " " 60.0	65
60.0 " " 67.5	58
67.5 " " 75.0	24
75.0 and under 82.5	10

Required:

(a) Draw a "less than" ogive to represent the above data. (8 marks)

(b) Using the "less than" ogive drawn in (a) above, estimate the median wage of the factory workers. (2 marks)

(c) Calculate the mode of the wages of the factory workers. (4 marks)

(d) Calculate the limits of the wages of the central 50% of the workers. (6 marks)

(Total: 20 marks)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 24 November 2020. **Time Allowed: 3 hours.**

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

QUESTION ONE

(a) Outline four properties of linear functions. (4 marks)

(b) The following quadratic function is provided:

$y = 3x^2 - 7x + 2$

Required:

(i) Plot the quadratic function curve within the limits $-2 \leq x \leq 4$. (6 marks)

(ii) Solve the equation $3x^2 - 7x + 2 = 0$ using the graph plotted in (b) (i) above. (1 mark)

(iii) Solve the equation $3x^2 - 7x - 2 = 0$ using the graph plotted in (b) (i) above. (1 mark)

(c) Simplify:

(i) $8^n \times 2^{2n} \div 4^{3n}$ (2 marks)

(ii) $16^{(3/4)n} \div 8^{[5/3]n} \times 4^{n+1}$ (3 marks)

(iii) $\log 4 + 2\log 3 - \log 6$ (3 marks)

(Total: 20 marks)

QUESTION TWO

(a) A father shared out his property to his family members as follows:

- Son received ⅕ of the total.
- Daughter received ⅓ of the total.
- Wife received ⅔ of the remainder.
- Younger brother and sister shared the balance in the ratio of 3:4 respectively.

Required:

If the younger brother received Sh.227,500, calculate the share of each beneficiary. (6 marks)

(b) A tourist visiting East Africa had 30,000 Swiss Francs. While in Kenya, he converted the Swiss Francs into Kenya Shillings and made the following payments:

- Paid transaction fees at 2%.
- Bought a Kenyan necklace for 3 US dollars.
- Bought a Kenyan basket for 40 Sterling pounds.

Before leaving for Uganda, he converted the remaining currency into Uganda shillings.

The following rates were applicable during the visit:

1 Swiss franc = Ksh.108.78.
1 US dollar = Ksh.103.50.
1 Sterling pound = Ksh.126.
1 Kenya shilling = Ugsh.35.

Required:
The amount received in Uganda shillings. (5 marks)

(c) A retailer bought second-hand shirts at a cost of Sh.6,120 per dozen. She later sold all the shirts at a 20% mark-up before allowing for a trade discount of 10% on the marked price of each shirt.

Required:
The marked price of each shirt. (4 marks)

(d) A farmer estimates that he needs 12 tractors to plough a piece of land in 15 days if he starts the work immediately.

Required:
(i) The number of tractors required to complete the work on time assuming that there is a delay of 5 days in starting the work. (3 mark)

(ii) The number of days required to complete the work assuming that the original number of tractors is reduced by a third. (2 marks)

(Total: 20 marks)

QUESTION THREE

(a) Outline two advantages of bar charts as a method of representing data. (2 marks)

(b) Highlight four sources of secondary data. (4 marks)

(c) The following table shows the length of 40 metal rods from a manufacturer recorded to the nearest millimetre (mm):

149	138	164	150	132	144	125	157
152	146	158	140	147	136	148	144
154	168	126	138	176	163	119	165
140	146	173	142	147	135	153	135
145	161	145	135	142	150	156	128

Required:
(i) A frequency distribution table using class intervals of 5mm. (6 marks)

(ii) A histogram and frequency polygon depicting the distribution of the length of the rods. (8 marks)

(Total: 20 marks)

QUESTION FOUR

(a) Summarise two advantages and two disadvantages of the mode as a measure of central tendency. (4 marks)

(b) The distribution of daily wages (in shillings) of 200 workers in a certain farm is as follows:

Monthly wages (Shillings)	150 – 220	220 – 290	290 – 360	360 – 430	430 – 500	500 – 570
Number of workers	24	50	64	30	20	12

Required:
(i) The mean daily wage. (2 marks)

(ii) The modal daily wage. (3 marks)

(iii) The median daily wage. (3 marks)

(iv) The standard deviation of the daily wages. (3 marks)

(c) A motor vehicle that costs Sh.820,000 is depreciated using the reducing balance method to a scrap value of Sh.215,000 within a useful life of 6 years.

Required:
The annual rate of depreciation of the motor vehicle using the logarithm method. (5 marks)
(Total: 20 marks)

QUESTION FIVE

(a) In the year 2019, George Ratemo earned a salary of Sh.456,000 plus a house allowance of 15% of the salary and a medical allowance of Sh.5,500 per month. He was also entitled to a personal tax relief of Sh.14,400 per annum.

The following taxation rates were applicable for the year 2019:

Annual income Sh.	**Tax rate** %
On the first Sh.129,900	10
On the next Sh.125,000	15
On the next Sh.125,000	20
On the next Sh.125,000	25
On all income over Sh.504,900	30

Required:

(i) Total taxable income for the year 2019. (2 marks)

(ii) The total tax payable by George Ratemo for the year 2019. (6 marks)

(iii) Net salary for the year 2019. (2 marks)

(b) Find the following integrals:

(i) $\int (5x^2 - 8x + 5)\,dx$. (2 marks)

(ii) $\int (-6x^3 + 9x^2 + 4x - 3)\,dx$. (2 marks)

(c) It costs a tailor Sh.26,000 to make 12 pairs of trousers and 8 shirts. The cost of making 5 pairs of trousers and 11 shirts is Sh.18,500. The tailor makes a profit of 30% and 20% on the cost of a pair of trousers and a shirt respectively.

Required:

(i) The cost of making a pair of trousers and a shirt using matrix algebra. (4 marks)

(ii) The selling price of a pair of trousers and a shirt. (2 marks)
(Total: 20 marks)

QUESTION SIX

(a) Define the following terms as used in probability:

(i) Event. (2 marks)

(ii) Experiment. (2 marks)

(iii) Outcome. (2 marks)

(b) Macz Limited intends to employ some workers to address its staffing needs. The candidates were taken through all the three stages of an interview. Out of the 800 candidates who were interviewed, the following failed the interview at the stated stages. 80 at stage 1, 72 at stage 2 and 36 at stage 3.

Required:

(i) Represent the above information in a tree diagram. (3 marks)

(ii) The probability that a randomly selected candidate will pass all the three stages of interview. (2 marks)

(iii) Approximate the number of candidates that should be interviewed in order for 120 candidates to successively pass all the three stages of the interview. (2 marks)

(c) In an arithmetic progression, the thirteenth term is 27 and the seventh term is three times the second term.

Required:

(i) The first term. (3 marks)

(ii) The common difference. (1 mark)

(iii) Sum of the first ten terms. (3 marks)

(Total: 20 Marks)

QUESTION SEVEN

(a) Find the value of the following:

(i) $\left[\frac{27}{8}\right]^{-\frac{2}{3}}$ (2 marks)

(ii) $\frac{27^{\frac{1}{2}} \times 243^{\frac{1}{2}}}{243^{\frac{4}{5}}}$ (3 marks)

(b) Johnstone Odera wishes to invest and accumulate Sh.5,000,000 at the end of five years. The compound interest rate being offered by Faidika Bank is 20% per annum.

Required:

The initial amount that should be invested in order to accumulate the projected amount. (3 marks)

(c) Differentiate the following functions:

(i) $y = 3x^3 - 4x^2 + 3x + 10.$ (2 marks)

(ii) $y = 0.5x^2 + x^{\frac{1}{2}} + 6.$ (2 marks)

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

$$3x + 2y = 106$$
$$2x + 4y = 92$$

(4 marks)

(e) Solve the following equation:

$3x^2 - 7x + 2 = 0$ (4 marks)

(Total: 20 marks)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

WEDNESDAY: 27 November 2019. **Time Allowed: 3 hours.**

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

QUESTION ONE

(a) List four factors that should be considered when collecting data for a particular investigation. (4 marks)

(b) The following data show the percentage marks scored by 30 students in a certain examination:

13	43	26	15	10
17	14	25	14	33
29	9	12	38	20
38	29	20	13	18
24	32	18	47	25
39	24	16	33	7

Required:

(i) A grouped frequency table starting with the class of 5 – 10 using the exclusive method. (6 marks)

(ii) The mean mark. (3 marks)

(iii) The standard deviation of the marks. (5 marks)

(iv) The coefficient of variation. (2 marks)

(Total: 20 marks)

QUESTION TWO

(a) Define the following terms:

(i) Rate. (2 marks)

(ii) Ratio. (2 marks)

(iii) Proportion. (2 marks)

(b) Ahmed Yusuf bought a television set on cash basis. He was offered a trade discount of 25% on the list price and a further 10% cash discount after the trade discount.

Required:

(i) The list price of the television set assuming that Ahmed Yusuf paid Sh.2,700 for it. (4 marks)

(ii) The selling price of the television set assuming that Ahmed Yusuf wishes to make a profit markup of 20%. (2 marks)

(c) A motor vehicle dealer imported 5 vehicles from the United Kingdom (UK) at a price of 32,000 Sterling pounds (£) per vehicle. The importer is required to pay an import duty of 25% on cost. He is also required to pay transportation expenses of Ksh.1,000,000.

1 Sterling pound (£) = Ksh.125.

Required:

(i) The total cost incurred by the motor vehicle dealer in Kenya shillings. (6 marks)

(ii) The selling price per vehicle assuming that the vehicle dealer intends to earn a profit of 12.5% on cost. (2 marks)

(Total: 20 marks)

QUESTION THREE

(a) Simplify the following expression:

$1\frac{3}{4} - (\frac{2}{3} \times \frac{3}{4}) + (1\frac{1}{2} \div \frac{2}{3}) - \frac{1}{2}$ (5 marks)

(b) A car cost Sh.896,000 when it was new five years ago. It depreciated at the rate of 15% during the first year and thereafter at the rate of 8% per annum.

Required:
The value of the car after 5 years. (4 marks)

(c) Halima Mwandawiro earns an annual salary of Sh.1,152,000. She receives a house allowance of Sh.36,000 per month, a medical allowance of Sh.13,478.40 per month and a travelling allowance of Sh.4,656 per month. She receives a personal relief of Sh.15,360 per annum. The following monthly bands of taxable income are applicable for the year.

Annual income (Sh.)	**Tax rate**
0 – 147,580	10%
147,580 – 286,623	15%
286,623 – 425,666	20%
425,666 – 564,709	25%
564,709 and above	30%

Required:
Determine the annual tax payable by Halima Mwandawiro. (8 marks)

(d) A trader sold an item to a wholesaler at a profit of 20% on cost. The wholesaler then sold the item to a retailer for Sh.2,400 at a profit of 25% on cost.

Required:
(i) The cost of the item to the trader. (2 marks)

(ii) The profit the trader would have made assuming he had sold the item directly to the retailer. (1 mark)

(Total: 20 marks)

QUESTION FOUR

(a) A small company borrows Sh.280,000 from a bank at an interest rate of 18% per annum compounded semi-annually.

Required:
Assuming that no repayments are made, compute the amount owed to the bank after 4 years. (6 marks)

(b) Jikaze Ltd. obtained a loan from Uwezo Bank Ltd. The amount of interest payable in the first month is Sh.12,000, in the second month Sh.11,750 and in the third month Sh.11,500. The interest is computed on a reducing balance basis.

Required:
Compute the total interest paid on the loan over a period of 42 months. (6 marks)

(c) The following data show the number of students enrolled in various courses at Elimu School of Accountancy for the last five years:

	CPA	**CS**	**CIFA**
Year 2013	81	32	2
Year 2014	85	46	4
Year 2015	90	62	9
Year 2016	77	59	14
Year 2017	97	90	28

Required:
Present the above data in the form of a percentage component bar chart. (8 marks)

(Total: 20 marks)

QUESTION FIVE

(a) State the two laws of probability. (4 marks)

(b) Vera Omondi recently won a prize in a lottery. She has decided to gift her husband with 30% of the prize, 25% to her mother, 15% to each of her two sons, 50% of the remainder to her brother and the rest she will donate to charity.

The donation to charity amounted to Sh.75,000.

Required:
The amount of money received by each of the above beneficiaries. (6 marks)

(c) Solve the following simultaneous linear equations:

$6x + 2y = 600$
$7x + 4y = 800$

(6 marks)

(d) Differentiate the following functions:

(i) $Y = -3x^3 + x^2 + 9x + 50$, with respect to x. (2 marks)

(ii) $Z = y^{\frac{1}{2}} + \frac{1}{3}y + 5$, with respect to y. (2 marks)

(Total: 20 marks)

QUESTION SIX

(a) Three partners A, B and C contributed Sh.2,250,000, Sh.1,350,000 and Sh.900,000 respectively to start a business venture. The partners' agreement provides that 45% of their business profits shall be divided equally among the partners and the balance shall be divided in the ratio of their capital contributions. During the year 2018, the total profit realised by the business amounted to Sh.1,282,500.

Required:
Determine the amount of profit each partner received during the year 2018. (6 marks)

(b) The following table shows a frequency distribution of marks obtained by 112 candidates in an entrance examination with a pass mark of 40%.

Marks (%)	Frequency
1 – 10	3
11 – 20	9
21 – 30	10
31 – 40	12
41 – 50	20
51 – 60	22
61 – 70	18
71 – 80	14
81 – 90	4

Required:

(i) Construct a less than cumulative frequency curve. (6 marks)

(ii) Estimate the percentage of candidates who failed the examination. (4 marks)

(iii) Estimate the percentage of candidates who scored between 40 and 74 marks. (4 marks)

(Total: 20 marks)

QUESTION SEVEN

(a) Simplify the following:

(i) $3^{n+1} \times 9^{n} \div 27^{\frac{2n}{3}}$ (3 marks)

(ii) $2 \log a + 3 \log b - \log c$. (3 marks)

(b) Solve the following equations:

(i) $2^{x} \times 2^{x+1} = 10$. (3 marks)

(ii) $5^{y-3} \times 25^{y+2} = 625$. (3 marks)

(c) Given that $A = \begin{pmatrix} 4 & -2 \\ 4 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & -1 \\ 1 & 1 \end{pmatrix}$

Required:

(i) Determine A^{-1}, the inverse matrix of A. (2 marks)

(ii) Solve the matrix equation $AX = B$; where X is a 2 x 2 matrix. (6 marks)

(Total: 20 marks)

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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, 30 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^{th} term of an arithmetic series is 57 and the 17^{th} 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:

$^1/_3$ on food.

$^1/_6$ on house rent.

$^1/_7$ on medical expenses.

$^1/_4$ 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	6
	88

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 $^1/_4$, $^1/_3$ and $^1/_6$ 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^{th} 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)

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CAMS LEVEL I

FUNDAMENTALS OF BUSINESS MATHEMATICS

TUESDAY: 27 November 2018. **Time Allowed: 3 hours.**

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

QUESTION ONE

(a) Explain the following terms with reference to probability:

(i) Mutually exclusive events. (2 marks)

(ii) Independent events. (2 marks)

(iii) Joint probability. (2 marks)

(iv) Conditional probability. (2 marks)

(b) The procurement officer of XYZ Limited bought a printer at a cost of Sh.25,000. He later sold the printer at Sh.30,000.

Required:

(i) The markup in percentage. (3 marks)

(ii) The margin in percentage. (3 marks)

(c) The following data show the marks in percentage scored by 50 students in a Fundamentals of Business Mathematics examination:

23	54	44	37	20	23	36	54
26	32	40	28	21	27	27	29
27	44	65	30	57	42	24	32
47	32	43	49	54	36	27	33
40	49	41	34	19	32	38	37
38	45	19	18	33	37	32	31
29	39						

Required:

A grouped frequency table with class intervals of size 5 starting with 15 per cent. (6 marks)

(Total: 20 marks)

QUESTION TWO

(a) Highlight two advantages and two disadvantages of the arithmetic mean as a measure of central tendency. (4 marks)

(b) The cost price of a calculator is Sh.3,000. The calculator is sold at a profit margin of 25%.

Required:

The ratio between cost price and selling price of the calculator. (4 marks)

(c) A certain tailor makes 12 shirts and 8 trousers at a total cost of Sh.3,440. The cost of making 5 shirts and 11 trousers is Sh.1,970. The tailor makes a profit of 35% and 40% on cost on each shirt and trouser respectively.

Required:

(i) The cost of making a shirt and a trouser. (4 marks)

(ii) The selling price of a shirt and a trouser. (2 marks)

(d) The following is an arithmetic progression:

-110, -38, 34, . . .

Required:

(i) The 10^{th} term. (3 marks)

(ii) The sum of the first 10 terms. (3 marks)

(Total: 20 marks)

QUESTION THREE

(a) Highlight six principles that guide the construction of graphs. (6 marks)

(b) A manufacturer makes two products, namely product Q and product M. The cost of making 15 units of product Q and 10 units of product M is Sh.600. The cost of making 5 units of product Q and 8 units of product M is Sh.340.

Required:

(i) Express the above costs of making one unit of product Q and product M in the form of simultaneous equations. (2 marks)

(ii) The cost of making one unit of product Q and one unit of product M. (4 marks)

(c) Michael Mwambire bought a machine worth Sh.108,000 on hire purchase terms. He paid an initial deposit of 30%. A flat rate interest of 15% is charged on the outstanding balance. The balance plus the interest is to be paid in 12 equal instalments.

Required:

(i) Initial deposit paid by Michael Mwambire. (2 marks)

(ii) Interest charged on the outstanding balance. (3 marks)

(iii) Amount of monthly instalment paid by Michael Mwambire. (3 marks)

(Total: 20 marks)

QUESTION FOUR

(a) Solve for x in the following equations:

(i) $2^{2x-3} = 128$. (2 marks)

(ii) $2(4x - 2) = 3(x + 2)$ (2 marks)

(b) Abdi Hassan wishes to invest Sh.1,000,000 in a fixed deposit account and he has two options:

Option I

To invest in a fixed deposit account with a commercial bank at a simple interest rate of 10% per annum for 3 years.

Option II

To invest in a fixed deposit account with a housing finance corporation at an interest rate of 8% compounded semi-annually for 3 years.

Required:

Advise Abdi Hassan on the better option to invest in. (6 marks)

(c) Pesa Bank Limited has collected the following data representing the total monthly incomes (in Shillings) of a sample of 80 account holders:

Monthly income (Sh.)	Frequency
5,000 - 10,000	2
10,000 - 20,000	3
20,000 - 30,000	5
30,000 - 40,000	10
40,000 - 50,000	15
50,000 - 80,000	26
80,000 - 100,000	19

Required:

(i) The mean monthly income. (3 marks)

(ii) The median monthly income. (3 marks)

(iii) The modal monthly income. (4 marks)

(Total: 20 marks)

QUESTION FIVE

(a) John, James and Jacob carried out a job in one day for which they were paid a total of Sh.5,120. John received $^3/_8$ and Jacob received $^3/_{16}$ of the total amount. The balance was received by James.

Required:

(i) Fraction of James' share. (2 marks)

(ii) The amount of money received by each of them. (3 marks)

(b) 30 men working 8 hours a day can complete a job in 50 days.

Required:

The number of hours 20 men will be required to work every day in order to complete the job in 40 days. (5 marks)

(c) The original price of a television set was Sh.45,000. The price was increased by 20% then it was reduced by 30%.

Required:

The current price of the television set. (4 marks)

(d) ABC Limited borrowed Sh.1,000,000 from a bank at an interest rate of 18% per annum compounded semi-annually. No payments were made in the course of a 5-year period.

Required:

The amount of money ABC Limited owed the bank after 5 years. (6 marks)

(Total: 20 marks)

QUESTION SIX

(a) Distinguish between "primary data" and "secondary data". (4 marks)

(b) Given the sequence:

$-^1/_3$, -1, -3, -9, -27, - , - , - ,

Obtain the next three terms in the sequence. (3 marks)

(c) Given that:

$$y = 3x^3 + 2x^2 + x$$

(i) Differentiate the above function with respect to x. (2 marks)

(ii) Find the value of the derivative in (c)(i) above when x = 3. (3 marks)

(d) Solve the following linear equation:

$$\left(\frac{6x}{7}\right) - \left(\frac{3x - 1}{5}\right) = 2$$

(4 marks)

(e) Find the value of x in the following quadratic equation.

$$4x^2 - x - 3 = 0$$

(4 marks)
(Total: 20 marks)

QUESTION SEVEN

(a) Define the following terms with reference to matrices:

(i) Null matrix. (2 marks)

(ii) Scalar matrix. (2 marks)

(iii) Diagonal matrix. (2 marks)

(iv) Inverse matrix. (2 marks)

(b) An American tourist visited your country with 20,380 Sterling pounds and 4,100 US dollars. The currency of your country is Shillings. He exchanged all the foreign currency into Shillings. The tourist stayed in your country for two months spending Sh.40,000 per day. He bought gifts worth Sh.300,000 and an air ticket for Sh.100,000.

Upon leaving the country, he exchanged the remaining cash into US dollars.

The rates of exchange during his visit were as follows:

I US dollar = Sh.90

1 Sterling pound = Sh.135

Assume one month has 30 days.

Required:

(i) The amount in Shillings that the tourist received on exchanging the Sterling pounds and the US dollars. (3 marks)

(ii) The amount of money the tourist received in US dollars after exchanging the balance of Shillings left at the end of his visit. (3 marks)

(c) Julius Chapa earns a salary which he spends as follows:

$^1/_5$ of the salary on house rent.

$^1/_3$ of the salary on his children's school fees.

$^1/_{10}$ on food, $^1/_4$ on clothing, $^1/_{20}$ on entertainment and the balance on miscellaneous expenditure.

In the month of June 2018, his pocket money was Sh.18,000.

Required:

(i) The salary earned by Julius Chapa in June 2018. (3 marks)

(ii) The amount of money used on each of the above items of expenditure. (3 marks)
(Total: 20 marks)

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