



kasneb

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<sup>2</sup>. On one site, the men have to lay the foundation of a building of size 50m<sup>2</sup> 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  $\frac{1}{4}$  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  $\frac{7}{22}$ . (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)  $\log_4 x + \log_4 (x - 12) = 3$ . (4 marks)

(ii)  $\log_6 (x + 4) + \log_6 (x - 2) = \log_6 (4x)$ . (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  $5\frac{1}{2}$  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:

$$\begin{aligned} 3x + 7y &= 27 \\ 5x + 2y &= 16 \end{aligned}$$

(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  $B = \begin{pmatrix} 2 & 5 \\ 2 & 0 \\ -1 & \end{pmatrix}$ ,

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:

$$\begin{aligned} 2x + 4y &= 1 \\ 5x - y &= 8 \end{aligned}$$

(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)  $y = -2 + \frac{4x^5}{5} - \frac{7x^8}{8}$  (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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