



CIFA PART I SECTION 1
FINANCIAL MATHEMATICS

TUESDAY: 26 November 2019.

Time Allowed: 3 hours.

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.

QUESTION ONE

- (a) Explain four types of finance. (8 marks)
- (b) Analyse the relationship between the discipline of finance and:
 - (i) Financial accounting. (2 marks)
 - (ii) Cost accounting. (2 marks)
 - (iii) Management accounting. (2 marks)
- (c) Solve the following equation using matrix method:

$$\begin{aligned} 4x - 3y &= 9 \\ 3x - 2y &= 7 \end{aligned}$$

(6 marks)
(Total: 20 marks)

QUESTION TWO

- (a) Explain four steps involved in the capital budgeting process. (8 marks)
- (b) Riko Ltd. would like to purchase a machine to produce product "J". The production manager has identified two machines, X and Y, which may be used to produce "J". Information relating to the two machines is as follows:

	Machine	
	X	Y
Cost (Sh.)	900,000	600,000
Annual net cash flows (Sh.)	240,000	168,000
Useful life (years)	6	6
Required rate of return (%)	11	11

Required:

- (i) Internal rate of return (IRR) for machine X and machine Y. (5 marks)
- (ii) Net present value (NPV) for machine X and machine Y. (5 marks)
- (iii) Advise the production manager on which machine to purchase based on the information in (b) (i) and (b) (ii) above. (2 marks)

(Total: 20 marks)

QUESTION THREE

- (a) The test scores in a college admission test are normally distributed with a mean of 450 and a standard deviation of 100.

Required:

- (i) The percentage of candidates who score between 400 and 500 marks. (3 marks)
- (ii) The percentage of candidates who score better or worse than candidates who scored 630 marks. (3 marks)
- (iii) The percentage of candidates admitted to college given that the cut off mark is 480. (3 marks)

- (b) The following table shows the daily production in kilogrammes of two machines in a factory, machine A and machine B, and the frequency of production per machine in hours.

Production Kilogrammes	Machine	
	A Hours	B Hours
100 – 104	6	10
105 – 109	8	13
110 – 114	13	17
115 – 119	21	26
120 – 124	17	20
125 – 129	11	15
130 – 134	8	12
135 – 139	4	9
140 – 144	<u>2</u>	<u>3</u>
	<u>90</u>	<u>125</u>

Required:

- (i) The mean production of each machine. (3 marks)
- (ii) The standard deviation of each machine. (6 marks)
- (iii) The coefficient of variation of each machine. (2 marks)

(Total: 20 marks)

QUESTION FOUR

- (a) The following data relates to sales made by AFL Limited for the past four years:

YEAR	QUARTERLY SALES (Sh.million)			
	1	2	3	4
2015	52.3	48.3	57.8	53.5
2016	51.4	47.6	50.2	52.8
2017	50.9	46.1	49.5	51.6
2018	49.2	45.3	48.7	50.3

Required:

- (i) A simple regression analysis equation for the data. (6 marks)
- (ii) The expected sales in the year 2019 using the function obtained in (a) (i) above. (4 marks)
- (b) Urembo Ltd. manufactures lipstick. "Red Rose" is their most popular brand. The marketing department has estimated the demand function for "Red Rose" is linear. If the price of Red Rose was fixed at Sh.570, the daily sales of the lipstick would be 400 pieces, whereas if the price is increased to Sh.820, the daily sales would drop to 200 pieces. Data from the production department indicates that the marginal cost (MC) of producing Q pieces of "Red Rose" is given by the equation:

$$MC = 2Q - 570$$

The daily fixed cost is Sh.1,100.

Required:

- (i) The revenue if Q pieces of Red Rose are sold. (4 marks)
- (ii) The total cost function. (2 marks)
- (iii) The daily break-even number of pieces. (4 marks)

(Total: 20 marks)

QUESTION FIVE

- (a) Outline four applications of index numbers in a business environment. (4 marks)

- (b) The following tables show prices and quantities of cereals over the years 2015-2018:

Cereal	Price per kilogramme (Sh.)			
	2015	2016	2017	2018
Millet	135	142	120	170
Sorghum	120	164	172	160
Wheat	80	90	70	65
Maize	200	180	160	210

Table 2

Cereal	Quantity consumed (kg)			2018
	2015	2016	2017	
Millet	600	680	720	800
Sorghum	720	900	1020	1100
Wheat	1200	1150	1180	1250
Maize	1600	1650	1500	1850

Required:

- (i) Paasche's price index for years 2017 and 2018 using 2015 as the base year. (6 marks)
- (ii) Laspeyres quantity index for the years 2017 and 2018 using 2015 as the base year. (6 marks)
- (c) Mary Mua, a sales representative, needs to make 4 sales from the next 8 customer visits to meet her monthly target. Experience has shown that the probability of a successful visit is 0.2.

Required:

The probability that she will meet her target.

(4 marks)

(Total: 20 marks)

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