



CERTIFICATE IN COMPUTER STUDIES
LEVEL 4 EXAMINATIONS
FINAL INTEGRATED SUMMATIVE EXAMINATIONS
SITTING: APRIL/MAY 2023

SUBJECT: BUSINESS MATHEMATICS AND STATISTICS

TIME: THREE (3) HOURS

TOTAL MARKS: 100

PASS MARK: 50

INSTRUCTIONS TO CANDIDATES:

1. Write your examination number and National Registration Card Number on the Answer Booklet provided. Ensure to append your signature in the space provided on the answer booklet.
2. Write your answer SCRIPT SERIAL NUMBER on the examination register provided and the entry slip.
3. There are seven (7) questions in this paper.
4. Attempt any Five (5) questions of your choice.
5. Each question carries twenty (20) marks.
6. Cell phones and programmable calculators are not allowed in the examination room.

DO NOT TURN THIS PAPER UNTIL YOU ARE TOLD TO DO SO

- a) Solve the following equations:
- (i) $x - 2(1 - 3x) = 6 + 3(4 - x)$ (3 marks)
- (ii) $3x + y = 18$ (5 marks)
- $4x + 2y = 21$
- b) The sum of K30,000.00 is invested in an account that offers 15% interest compounded annually for 3 years. Calculate the Future value of the investment after three years. (5 marks)
- c) A machine costing K50,000.00 depreciates to a scrap value of K1,500.00 after ten years.
- (i) Calculate the annual percentage rate of depreciation using reducing balance method. (4 marks)
- (ii) The book value of the machine at the end of the sixth year. (3 marks)

Total (20 marks)

QUESTION 2

- a) An arithmetic progression is given by 48, 40, 32, 24, ... Find the;
- (i) 10th term of the progression. (3 marks)
- (ii) Sum of the first 10 terms of the progression. (4 marks)
- b) In investment in a new project is expected to give the following cash flow.

Year	0	1	2	3	4	5	6
Cash flow	(6000)	(1000)	2500	2000	1500	1500	1000

- If the cost of capital is 15%. Calculate the Net Present Value NPV. (5 marks)
- c) The distribution of marks (%) in a Mathematics test for 10 students is given as follows: 50, 65, 40, 55, 75, 85, 75, 66, 48, 75. Calculate:
- (i) The mean mark (3 marks)
- (ii) The standard deviation of the marks (5 marks)
- Total (20 marks)

$$NPV = \sum \frac{P}{(1+i)^n}$$

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n}}$$

$$\frac{634 - 55}{10} = \frac{579}{10} = 57.9$$

25.4.4.23

QUESTION 3

- a) The following table shows the ages of 45 students in a computer studies class.

Age (x)	16	17	18	19	20
No. of students (f)	3	10	15	12	5

Determine the;

- (i) Mean of the ages. ≈ 90 (2 marks)
 (ii) Mode of the ages. ≈ 18 (2 marks)
 (iii) Median age. (4 marks)

- b) The mean salary of workers in a factory is K1,600 and the standard deviation is K134. Assume that the salaries are normally distributed.

Calculate the probability that a worker gets:

- (i) a salary between K1,700 and K2,000 (6 marks)
 (ii) exactly K1,300 (3 marks)
 (iii) less than K1,950 (3 marks)

Total (20 marks)

QUESTION 4

- a) The following data relate to the years of experience in the wiring of components and the number of components which were rejected as unsatisfactory the previous year.

Years of experience (X)	4	5	7	9	10	11	12	14
Number of rejects (y)	21	22	15	18	14	14	11	13

- (i) Draw a scatter diagram of the data. (6 marks)
 (ii) Calculate the product moment correlation coefficient between years of experience and number of rejects. (9 marks)

- b) Solve for x in the following expression: $\frac{x-3}{x} = \frac{2x}{x-1}$ (5 marks)

Total (20 marks)

mean $1,600$ sd 134

QUESTION 5

- a) A Computer manufacturing company has developed the following Revenue and Cost functions:
- Revenue $(x) = 118x - x^2$
- Cost $(x) = 1710 + 9x$ where x = Number of computers needed to maximize profit. (3 marks)
- Determine the profit function. (4 marks)
 - Find the number of computers needed to maximize profit. (3 marks)
 - Find the maximum profit.
- b) If 9 men can build a house in 20 days, calculate the number of men needed to build the same house in 12 days. (4 marks)
- c) Mr. Jack deposited K150, 000 in an account that pays 20% interest compounded annually. Calculate the time it will take for it to amount to K250, 000. (6 marks)

Total (20 marks)

QUESTION 6

- a) The prices and quantities of three products X, Y and Z for 2001 and 2002 are as shown below:

Item	2020		2021	
	Price	Quantity	Price	Quantity
X	20	50	22	45
Y	40	44	45	48
Z	50	36	55	50

Using 2020 as base year:

Calculate the:

- Simple price index number of item Z. (3 marks)
- Paasche's Price index number. (6 marks)

- b) Solve for x in the following expression: $\log_3 \sqrt{81} + \log_3 27 - \log_3 3 + 2$ (5 marks)

$$\log_3 \sqrt{81} + \log_3 27 - \log_3 3 + 2$$

$$\log_3 = 9 \times 27 \div 5$$

$$\log_3 = 9 \times 5 \cdot 4$$

5.4.4.23

- c) A peasant farmer deposited a sum of K5, 000.00 in his account. After **five (5)** years, the money amounted to K25, 000.00. If interest was compounded annually, find the rate of compound interest. (6 marks)

Total (20 marks)

QUESTION 7

A manufacturer can produce **two (2)** kinds of building blocks; *X* and *Y*, using the same equipment in a similar three- stage process involving mixing, cooking and packaging. Product *X* sells at a profit of K5.00 and *Y* sells at a profit of K7.25. The basic requirements are as follows:

	Processing Time (minutes)		Equipment availability
	<i>X</i>	<i>Y</i>	
Mixing	2	4	24 hours
Moulding	10	8	64 hours
Cubing	3	1	15 hours

The manufacturer wishes to maximize profit.

- State the objective function. (2 marks)
- Construct the constraint functions. (6 marks)
- Graph the constraint functions. (6 marks)
- Find the maximum profit. (6 marks)

Total (20 marks)

$$\begin{aligned}
 x - 2(1 - 3x) &= 6 + 3(4 - x) \\
 x - 2 - 6x &= 6 + 12 - 3x \\
 x - 6x + 3x &= 6 + 12 + 2 \\
 -5x + 3x &= 20 \\
 -8x &= 20
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } 3x + y &= 18 \quad | \times 4 \\
 4x + 2y &= 21 \quad | \times 3 \\
 \hline
 12x + 4y &= 72 \\
 12x + 6y &= 63 \\
 \hline
 12x + 6y &= 72 \\
 12x + 6y &= 63 \\
 \hline
 0 &= 9
 \end{aligned}$$

$$\begin{aligned}
 3x + y &= 18 \\
 3x + 10 &= 18 \\
 3x &= 18 - 10 \\
 3x &= 8 \\
 \frac{3x}{3} &= \frac{8}{3}
 \end{aligned}$$