

**NATIONAL UNIVERISTY OF LESOTHO**

**B. ED. EXAMINATIONS**

**BE2304: BUSINESS CALCULATIONS I**

**JANUARY 2024**

**MARKS: 100**

**TIME: 3 HOURS**

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**INSTRUCTIONS:** SECTION A IS COMPULSORY WITH A TOTAL OF 40 MARKS  
FROM SECTION B, ANSWER THREE QUESTIONS **ONLY**.  
EACH QUESTION IS WORTH 20 MARKS  
**SHOW ALL YOUR WORKING**

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**DO NOT OPEN THIS SPACE UNTIL YOU HAVE BEEN TOLD TO DO SO BY THE  
EXAMINATIONS OFFICER**

Number of pages  
(including this one)

**3**

## SECTION A

- a) By using the discriminant only, how many solutions does the given quadratic equation have  $x^2 + x - 2 = 0$ . (4)
- b) Solve the following equations
- i)  $-3x + 2 = -2$ . (4)
- ii)  $\frac{2x-3}{2} + \frac{x-1}{3} = \frac{3x-1}{2}$  (4)
- c) Solve:  $3x^2 - 11x - 4 = 0$  (4)
- d) Let  $\log_b(2) = 0.3869$ ,  $\log_b(3) = 0.6131$ , and  $\log_b(5) = 0.8982$ . Using these values, evaluate  $\log_b(2 \times 3)$ . (3)
- e) Write in exponential form then find the value of  $x$  in the following:
- i)  $\frac{1}{2} = \log_x 20$
- ii)  $\log_2 64 = x$
- iii)  $\log_3 x = 7$  (9)
- f) Find the value of  $x$  and  $y$ :
- $$\begin{aligned} 3x - 4y &= 17 \\ 5x &= 19 + 2y \end{aligned}$$
- (4)
- g) Given:  $Y = \frac{5x+5b}{3x-3a}$ , make  $x$  the subject of the formula (4)
- h) Find:  $\sqrt{(36a^6b^8)}/(a^3b^4)$  (4)

[40]

## SECTION B

### Question 1

- a) Find the simple interest on M20,000 at the rate of 4% for 5 years. Also find the total amount after this time. (5)
- b) What amount was borrowed, for which the amount of simple interest is M400 at the rate of 5% for 4 years (5)
- c) How much money would you need to deposit today at 9% annual interest compounded monthly to have M12000 in the account after 6 years? (5)
- d) If you deposit M5000 into an account paying 6% annual interest compounded monthly, how long until there is M8000 in the account? (5)

[20]

### Question 2

- a) Given the demand functions:  $P = 80 - 3Q$
- i) Find the price when  $Q = 10$  and deduce the total revenue. (3)
- ii) What is the quantity demanded when  $P = 20$ ? (3)

iii) If fixed costs are 100 and variable costs are 5 per unit, find the total cost when  $Q = 10$ .(3)

b) Given the consumption function  $C = 0.7Y + 30$

i) Sketch the graph (2)

ii) Determine the corresponding savings function and sketch the graph. (4)

iii) Find the equilibrium level of income and consumption if the planned investment  $I=12$ . (5)

[20]

### Question 3

a) If a retail store has fixed cost of R150 and variable cost per unit is R170 and sells its product at R200 per unit.

i) Find the cost function TC (2)

ii) What would the revenue function TR be? (1)

iii) What would the profit function be? (2)

iv) What is the profit at  $Q = 10$ ? (3)

b) If fixed costs are 4, variable costs per unit are 1 and the demand function is:

$$P = 10 - 2Q,$$

i) Calculate the average costs when  $Q = 2$  (2)

ii) Find an expression for  $\pi$  in terms of  $Q$  and sketch a graph of  $\pi$  against  $Q$ . (7)

iii) For what values of  $Q$  does a firm break even? (3)

[20]

### Question 4

a) Find the expression for the profit function given the demand function:

$$2Q + P = 25 \text{ and the average cost function: } AC = \frac{32}{Q} + 5$$

Find the value of  $Q$  for which the firm:

(i) breaks even (3)

(ii) Maximises profit (3)

(iii) Sketch the AC function (4)

b) Sketch the graph of  $y = x^2 - x - 6$ , clearly showing the **intercepts** and **turning point**. (10)

[20]