NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF MANAGEMENT SCIENCES

DEPARTMENT OF ACCOUNTING, ECONOMICS AND FINANCE

QUALIFICATION: BACHELOR OF ECONOMICS	
QUALIFICATION CODE: 12BECO	**LEVEL:** 7
COURSE CODE: MEC712S	**COURSE NAME**: MATHEMATICAL ECONOMICS
SESSION: JANUARY 2025	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	**MR EDEN TATE SHIPANGA**
MODERATOR:	**DR R. KAMATI**

INSTRUCTIONS
4. Answer ALL the questions. 5. Write clearly and neatly. 6. Number the answers clearly.

PERMISSIBLE MATERIALS

4. PEN,
5. PENCIL
6. CALCULATOR

THIS QUESTION PAPER CONSISTS OF 2 PAGES (Including this front page)

Question 1 [25 Marks]

Consider the following Microeconomic market model, where A is the level of technology.

$$Q = D(P, Y) \qquad [D_P < 0, D_Y > 0]$$

$$Q = S(P, A) \qquad [S_P > 0;\ S_A > 0]$$

Analyse the comparative statics of the model to find the effect of the level of technology and Income on the equilibrium quantity and price simultaneously. **(25)**

Question 2 [25 Marks]

Consider the following simple one commodity market model:

$Q = b - aP$ (a, b > 0) [demand]

$Q = -d + cP$ (c, d > 0) [supply]

1. Find the Equilibrium Price P* and Quantity Q*? **(10)**
2. Use partial derivative to find the effect of the parameters (a, b, c and d) on the equilibrium quantity? **(15)**

Question 3 [25 Marks]

i. Use Jacobian determinants to test the existence of functional dependence between the paired functions.

a)

$$y_1 = 3x_1^2 + x_2$$

$$y_2 = 9x_1^4 + 6x_1^2(x_2 + 4) + x_2(x_2 + 8) + 12$$ **(5)**

b)

$$y_1 = 3x_1^2 + 2x_2^2$$

$$y_2 = 5x_1 + 1$$ **(5)**

ii. Optimise the following function, a) find the critical value for the first order condition and b) the high-order Hessian:

$$y = 4x_1^2 - 7x_1 - x_1x_2 + 8x_2^2 - 5x_2 + 2x_2x_3 + 4x_3^2 + 2x_3 - 4x_1x_3$$ **(15)**

Question 4 [25 Marks]

Maximise profits using Kuhn-Tucker conditions, $\pi = 54x - x^2 + 76y - 3y^2 - 12$ subject to the production constraint $x + y \leq 35$ **(25)**

TOTAL MARKS: 100