



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF MANAGEMENT SCIENCES

DEPARTMENT OF ECONOMICS, ACCOUNTING AND FINANCE

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

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	MR EDEN TATE SHIPANGA
MODERATOR:	MR. GEBHARD LUCKY SHIGWEDHA

INSTRUCTIONS
<ol style="list-style-type: none">1. Answer ALL the questions.2. Write clearly and neatly.3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. PEN,
2. PENCIL
3. CALCULATOR

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

Question 1 [25 Marks]

Consider the following simple one commodity market model:

$$Q = b - aP \quad (a, b > 0) \quad [\text{demand}]$$

$$Q = -d + cP \quad (c, d > 0) \quad [\text{supply}]$$

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 2 [25 Marks]

Formulate a closed economy national income model (IS-LM analysis model) system of equations. Where consumption and demand for money is considered to be strictly increasing function of income [a fraction of income ($0 < C_y < 1$ and $L_y > 0$)], tax is ignored (or tax does not exist), investment and demand for money is said to be strictly decreasing function of rate of interest ($I_r < 0$ and $L_r < 0$) and Government spending and Money supply are exogenously determined as G_0 and M_s^0 . Analyse the comparative statics of the model to find the effect of expansionary fiscal and monetary policy on the equilibrium level of income and interest rate? (25)

Question 3 [25 Marks]

Give the input matrix and the final demand vector

$$A = \begin{bmatrix} 0.05 & 0.25 & 0.34 \\ 0.33 & 0.10 & 0.12 \\ 0.19 & 0.38 & 0 \end{bmatrix} \quad d = \begin{bmatrix} 1800 \\ 200 \\ 900 \end{bmatrix}$$

- (a) Explain the economic meaning of the elements 0.33, 0 and 200 (9)
- (b) Explain the economic meaning (if any) of the third column sum (3)
- (c) Find the solution output levels by Cramer's rule (13)

Question 4 [25 Marks]

1. 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)
2. Use discriminants to determine whether each of the following quadratic function is positive or negative definite:
 $y = 5x_1^2 - 6x_1x_2 + 3x_2^2 - 2x_2x_3 + 8x_3^2 - 3x_1x_3$ (10)

TOTAL MARKS: 100



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