NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF MANAGEMENT SCIENCES

DEPARTMENT OF ACCOUNTING, ECONOMICS AND FINANCE

QUALIFICATION: BACHELOR OF TECHNOLOGY IN ECONOMICS	
QUALIFICATION CODE: 12BECO	**LEVEL: 7**
COURSE CODE: AME311S	**COURSE NAME:** APPLIED MATHEMATICAL ECONOMICS
SESSION: JUNE 2019	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	**MR EDEN TATE SHIPANGA**
MODERATOR:	**PROF T. SUNDE**

INSTRUCTIONS
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]

Given $Y = C + I_0 + G_0$,

$C = \alpha + \delta\, Yd$ $\quad (\alpha > 0;\ 0 < \delta < 1)$

$T = \gamma + \beta Y$ $\quad (\gamma > 0;\ 0 < \beta < 1)$

Where γ is non-income tax, β is income tax, δ is marginal propensity to consume, α is fixed constant, Y (national income), I_0 (investment) and G_0 (government expenditure)

1. Find the reduced form of equilibrium income (Y_e). **5 marks**
2. Do comparative static to find the effect of government spending, non-income tax and income tax on equilibrium income. **15 marks**
3. If $\alpha = 85$; $\delta = 0.75$; $\gamma = 20$; $\beta = 0.2$; $I_0 = 45$; $G_0 = 50$, find the effects of lump sum tax increase by \$1 billion? **5 marks**

Question 2 [25 Marks]

1. Solve the following system of equation using Cramer's rule

$$8X_1 - X_2 = 16$$
$$2X_2 + 5X_3 = 5$$
$$2X_1 - 3X_3 = 7$$

10 marks

2. Optimise the following function, using a) Cramer's rule for the first order condition and b) the Hessian for the second-order condition:

$$y = x_1^2 - 7x_1 - x_1x_2 + 2x_2^2 - 2x_2 + 2x_2x_3 + 2x_3^2 + x_3 - 3x_1x_3$$

15 marks

Question 3 [25 Marks]

Give the input matrix and the final demand vector

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

(a) Explain the economic meaning of the elements 0.33, 0 and 200 **9 marks**

(b) Explain the economic meaning (if any) of the third column sum **3 marks**

(c) Explain the economic meaning (if any) of the third row sum **3 marks**

(d) Find the solution output levels by Cramer's rule **10 marks**

Question 4 [25 Marks]

Consider the following national income model (tax ignored).

$$Y - C(Y) - I(i) - G_0 = 0 \qquad [0 < C' < 1; I' < 0]$$
$$kY + L(i) - M_{s0} = 0 \qquad [k > 0; L' < 0]$$

Analyse the comparative statics of the model to find the effect of expansionary fiscal and monetary policies?

25 marks

Total **[100 marks]**