QUALIFICATION: BACHELOR OF TECHNOLOGY ECONOMICS

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<tr>
<th>QUALIFICATION CODE: 12BECO</th>
<th>LEVEL: 7</th>
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<tr>
<td>COURSE CODE: AME311S</td>
<td>COURSE NAME: APPLIED MATHEMATICAL ECONOMICS</td>
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<td>SESSION: JULY/AUGUST 2017</td>
<td>PAPER: THEORY</td>
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<td>DURATION: 3 HOURS</td>
<td>MARKS: 100</td>
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SUPPLEMENTALY/ SECOND OPPORTUNITY EXAMINATION QUESTION PAPER

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<th>EXAMINER(S)</th>
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<tr>
<td>MR EDEN TATE SHIPANGA</td>
<td>DR T. SUNDE</td>
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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

Given $\alpha$ is non-income tax, $\beta$ is income tax, $\delta$ is marginal propensity to consume, $y$ is autonomous consumption, $Y$ (national income), $I_0$ (investment) and $G_0$ (government expenditure)

1. Formulate the equations needed to find the reduced form of equilibrium income ($Y_e$).  5 marks
2. Do a comparative static to find the effect of income tax, non-income tax and government spending on equilibrium income.  15 marks
3. If $\beta = 0.2; \alpha = 20; y = 80; \delta = 0.25; I_0 = 45; G_0 = 50$, find the effects of lump sum tax increase by $1$ billion?  5 marks

Question 2

Consider the following national income model (tax ignored).

$$Y = C(Y) + I(i) + G_0 \quad [0 < C' < 1; I' < 0]$$

$$kY + L(i) = M^{\delta} \quad [k > 0; L' < 0]$$

Analyse the comparative statics of the model to find the effect of expansionary fiscal and monetary policy? 25 marks

Question 3

1. Use Jacobian determinants to test the existence of functional dependence between the paired functions.
   a) $y_1 = 3x_1^2 + x_2$
   $y_2 = 9x_1^4 + 6x_1^2(x_2 + 4) + x_2(x_2 + 8) + 12$
   b) $y_1 = 3x_1^2 + 2x_2^2$
   $y_2 = 5x_1 + 1$  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:
   $$y = 5x_1^2 - 7x_1 - x_1x_2 + 8x_2^2 - 6x_2 + 4x_2x_3 + 6x_3^2 + 4x_3 - 5x_1x_3$$  15 marks

Question 4

1. Integrate the following definite integral, using the method of integration by parts:
   $$\int_2^5 \frac{3u}{(u+2)^2} du$$  10 marks

2. Given $f(u) = -u^2 + 6u - 5$
   a) Construct a phase diagram and test the dynamic stability using;
   b) The arrows of motion,
   c) The slope of the phase line,
   d) The derivative test.  15 marks

TOTAL MARKS: 100