## Examination Period 2: 2018/19

**ECNM01019N**

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Advanced Microeconomics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>Seven</td>
</tr>
<tr>
<td>Time Allowed</td>
<td>Three hours</td>
</tr>
</tbody>
</table>

**Instructions to students:**

- Enter your student number **not** your name on all answer books.
- Answer **five** out of **eight** questions.
- Show your workings clearly.
- Begin each question on a separate page; label each page clearly with the number of the question you are answering.
- The use of a calculator **is** permitted.

<table>
<thead>
<tr>
<th>No. of Pages</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Questions</td>
<td>8</td>
</tr>
</tbody>
</table>
Answer five out of eight questions.

**Question 1**

Given that a firm has the following production function \( Q = 6K^{\frac{1}{3}} + 9L^{\frac{1}{3}} \), and an iso-cost relationship given by \( 2K + 3L = 100 \). Where \( Q \) is the output rate, \( K \) is the number of machine hours, and \( L \) is the number of labour hours.

Use the information to answer the below questions:

a.  
   i. calculate the degree of homogeneity of the production function.  
      (3 marks)
   ii. determine the nature of the returns to scale exhibited by the production function.  
       (2 marks)

b.  
   i. calculate the amount of machine hours that are needed to maximise output \( Q \).  
      (5 marks)
   ii. calculate the amount of labour hours that are needed to maximise output \( Q \).  
      (5 marks)

c.  
   i. calculate the Lagrange multiplier.  
      (3 marks)
   ii. interpret your results in c.i.  
      (2 marks)

**Total: 20 marks**

**Question 2**

An individual has the following utility function: \( U = 12X_1^\frac{1}{3}X_2^\frac{3}{4} \), where \( X_1 \) is the consumption of commodity 1, \( X_2 \) is the consumption of commodity 2, and \( U \) is total utility. If the price of commodity 1 is 4 and the price of commodity 2 is 12, use the information to answer the below questions:

a. how much of \( X_1 \) and \( X_2 \) should the individual consume to minimise spending and achieve a total utility of 120 units?  
   (8 marks)

b.  
   i. calculate the value of the Marginal Rate of Substitution (MRS) when \( x_1 = 50 \) and \( x_2 = 150 \).  
      (6 marks)
   ii. interpret your answer to b.i above.  
       (2 marks)

c. with a suitable graph explain the role played by the Marginal Rate of Substitution (MRS) in analysing consumer’s utility maximisation.  
   (4 marks)

**Total: 20 marks**
Question 3

a. Critically discuss the concept of externalities. (10 marks)

b. Explain two of the solutions to the problem introduced by externalities. (10 marks)

Total: 20 marks

Question 4

a. Using your knowledge of the theory of consumer preference explain the following assumptions:

i. complete (3 marks)

ii. reflexive (3 marks)

iii. transitive (3 marks)

b. “Consumers compare the utility of the expected value and the expected utility of a gamble” using graphs distinguish between the following:

i. a risk averse consumer (4 marks)

ii. a risk loving consumer (4 marks)

iii. a risk neutral consumer (3 marks)

Total: 20 marks

Question 5

Consider the game with the following pay-off matrix:

| Player A    | Player B
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left</td>
</tr>
<tr>
<td>Top</td>
<td>3,3</td>
</tr>
<tr>
<td>Middle</td>
<td>3,0</td>
</tr>
<tr>
<td>Bottom</td>
<td>0,0</td>
</tr>
</tbody>
</table>

a. Determine whether a dominant strategy exist in this game. Explain why. (6 marks)

b. Determine whether a dominated strategy exist in this game. Explain why. (7 marks)

c. What are the Nash Equilibria of the game after eliminating dominated strategies? Explain why. (7 marks)

Total: 20 marks
Question 6

a. Explain briefly the following concepts:
   
i. homogenous of degree one (2 marks)
   ii. monotonicity (2 marks)
   iii. concavity (2 marks)

b. Consider the following cost function: \( c(w, y) = \frac{1}{2y^2(w_1w_2)^2} \), determine if it is:
   
i. homogenous of degree one (4 marks)
   ii. monotonic (4 marks)
   iii. concave (4 marks)
   iv. continuous (2 marks)

Total: 20 marks

Question 7

Given that farmers produce corn from land and labour, and the labour cost to produce \( y \) bushels of corn is \( c(y) = y^2 \), and there are 100 identical farms which behave competitively. Use this information to answer the below questions.

a. What is the individual farmer’s supply function for corn? (4 marks)

b. What is the market supply of corn? (3 marks)

c. Assuming the demand function is given as: \( D(p) = 200 - 50p \), calculate:
   
i. the equilibrium price. (5 marks)
   ii. equilibrium quantity. (5 marks)

d. What is the equilibrium rent on the land? Explain why. (3 marks)

Total: 20 marks
Question 8

A monopolist has a cost function of $c(y) = y$ so that its marginal costs are constant at £1 per unit. It faces the following demand curve:

$$D(p) = \begin{cases} 
0, & \text{if } p > 20 \\
\frac{100}{p}, & \text{if } p \leq 20 
\end{cases}$$

a. calculate the profit-maximising output. \hfill (7 marks)

b. If the government could set a price ceiling on this monopolist in order to force it to act as a competitive firm, what price should the government set? \hfill (7 marks)

c. What output would the monopolist produce if forced to behave as a competitive firm? \hfill (6 marks)

Total: 20 marks