****

**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2019/2020 ACADEMIC YEAR ONE**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF BUSINESS AND ECONOMICS**

**FOR THE DEGREE OF BACHELOR OF BUSINESS MANAGEMENT**

**COURSE CODE: ECO 113**

**COURSE TITLE: INTRODUCTION TO MATH II**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 15/12/2020 TIME: 12.00-2.00 PM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of FOUR (4) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

(a) Define the following terms as used in business:

(i) Consumers’ surplus **[2 marks]**

(ii) Producers’ surplus **[2 marks]**

(b) The output, Q for a firm over time, t in years is given by the function



Determine the years in which the output is at maximum and minimum. **[6 marks]**

(c) The production function, Q of a commodity is given by



Where: L is the labour input

K is the capital input

Find the marginal product of labour (MPL) and marginal product of capital (MPK) when L=1 and

K=2. **[5 marks]**

(d) The marginal cost (MC) function is given by and  when.

Find the total cost  function**. [4 marks]**

(e) The demand and supply function curves for a good are given respectively by the equations:

 and 

Find the equilibrium price P and quantity Q. **[5 marks]**

(f) A manufacturer makes two products  and. The first requires 5 hours for processing, 3 hours for

assembling and 4 hours for packaging. The second requires 2 hours for processing, 12 hours for

assembling and 8 hours for packaging. The plant has 40 hours available for processing, 60 hours for

assembling and 48 hours for packaging. The profit margin for is $7 and for it is $21.

Express the data in equations and inequalities necessary to determine the output mix that will

maximize profits. **[6 marks]**

**QUESTION TWO (20 MARKS)**

The demand function for a good is given by  , while the total cost (TC) is given by

, where P is the price and Q is the quantity.

**Required:**

1. Write down expressions for the total revenue (TR) and the profit function () **[4 marks]**
2. Sketch the TC and TR functions on the same diagram **[5 marks]**
3. Find algebraically, in terms of Q, when the firm breaks even, makes a profit and makes a loss**.**

**[6 marks]**

1. Determine the maximum profit and the value of Q at which profit is maximum. **[5 marks]**

**QUESTION THREE (20 MARKS)**

**(a)** A firm employing labour (L) as the only factor input has the following production function.



**Required:**

** (i)** Find the critical value of L. **[4 marks]**

**(ii)** Confirm that the critical value of L maximizes Q. **[5 marks]**

**(b)** The total revenue and total cost of a multinational firm are given as follows:



**Required:**

** (i)** Find the profit () function. **[2 marks]**

**(ii)** Determine the critical values of Q for the profit function. **[4 marks]**

**(iii)** Confirm that the critical value maximizes profit **[5 marks]**

**QUESTION FOUR (20 MARKS)**

1. Find the cross-partial derivatives of the function  **[4 marks]**
2. For a multinational company, the number of units produced when using units of labour and

 units of capital is given by



**Required:**

* 1. Find the equations for both marginal productivities (MPL and MPK) **[4 marks]**
  2. Evaluate and interpret the results in **(i)** when 625 units of labour and 81 units of capital are used **[4 marks]**

**(c)** A production function is given by the equation where K is the capital input and

L the labour input.

**Required:**

* 1. Find themarginal productionof labour andmarginal production of capital. **[2 marks]**
  2. Determine whether or not the function is characterized with diminishing returns to factor inputs. **[6 marks]**

**QUESTION FIVE (20 MARKS)**

1. Evaluate  **[4 marks]**

**(b)**The marginal cost function is given by the equation. Find the total cost function (TC) given that TC=50 when Q=2. **[4 marks]**

**(c)**The supply function is given by the equation  where Q is the quantity of goods.

**Required:**

Calculate the producers’ surplus when the market equilibrium price units. Graph the

the supply function and shade the producers’ surplus. **[6 marks]**

**(d)**The demand function is given by the equation  where Q is the quantity of goods.

**Required:**

**(i)** Calculate the consumers’ surplus when the market equilibrium price  units. Graph the

the demand function and shade the consumers’ surplus. **[6 marks]**