

**UNIVERSITY OF KABIANGA**

**UNIVERSITY EXAMINATIONS**

**2014/2015 ACADEMIC YEAR**

**FIRST YEAR SECOND SEMESTER EXAMINATION**

**FOR THE DEGREE OF BACHELOR OF ARTS (ECONOMICS)**

**COURSE CODE: ECO 113**

**COURSE TITLE: INTRODUCTION TO MATHS II**

**DATE: 15TH MAY, 2015**

**TIME: 9.00 A.M-12.00 P.M**

**INSTRUCTIONS TO CANDIDATES:**

Answer any **FOUR** questions. Each question on a new page.

**QUESTION ONE (25 MARKS)**

1. Sketch the following pairs of parabolic functions separately, and state which arms of the functions would qualify as demand/supply functions.
2. Y = -10 + X2

Y = 88 – X2 (8marks)

1. Y = 9 + X2

Y = 41 – X2 (8 marks)

1. For the given production transformation curve, sketch and find the highest amount of **P** and **Q** that can be produced. (9 marks)

Q2 + P2 = 9

**QUESTION TWO (25 MARKS)**

1. Find the total revenue function corresponding to the following average revenue function. (9 marks)

Q + 3P = 6

1. The demand function for a firm is given by:

P = β1 - β2 Q

Find:

1. The average revenue function of the firm and comment on your result. (8 marks)
2. The total revenue function of the firm. (8 marks)

**QUESTION THREE (25 MARKS)**

1. Consider the following demand and cost functions:

P = 25 – 3Q

TC = Q2 – 6Q

If a per unit tax “**t**” is imposed on the output, determine:

1. The maximum profit. (4 marks)
2. The change in price. (4 marks)
3. The tax rate “**t**” that will maximize total **T** (where **T** = **tQ**). (5 marks)
4. The maximum tax **T**. (4 marks)
5. For the following utility functions:

U = AQ1/21 Q2 and U = 3Q12 + 2Q1 Q2 – Q22

1. Determine the marginal utility with respect to Q1 and Q2. (4 marks)
2. Find out whether the utility functions display increasing or decreasing marginal utility with respect to Q1 and Q2. (4 marks)

**QUESTION FOUR (25 MARKS)**

1. The following market models

Qd = α0 – α1 P

QS = -β0 + β1P

has the following equilibrium price and quantity;

P = $\frac{α0+β0}{α1+β1}$ Q = $\frac{α0 β1+α1 β0}{α1+ β1}$

Find the effect of:

1. Changes in **β1**and **β0**on equilibrium price. (4 marks)
2. Changes on **α1**and **α0**on equilibrium price. (4 marks)
3. Given the following optimization problem:

Optimize Z = XY

Subject to 2X + Y = 4

1. Write out the lagrangian function for the problem. (2 marks)
2. Find the critical values of **X,** **Y** and **Z**. (6 marks)
3. Find the stationary value **Z**. (4 marks)
4. Determine whether the stationary value **Z** is a maximum or a minimum, by applying the second-order condition. (5 marks)

**QUESTION FIVE (25 MARKS)**

1. Determine the sign definiteness of the following by Hessian and Discriminant approach.
2. Q = 2X2 - 4XY + 3Y2 (3 marks)
3. Q = 5X2 – 3Y2 (3 marks)
4. Q = - $\frac{1}{2}$X2 + 2XY – 8Y2 (3 marks)
5. A two-product firm has the following total revenue and total cost functions:

 TR = 8Q1 + 12Q2

TC = 2Q12 + 2Q22

1. Design the profit function. (2 marks)
2. Find the critical values of Q1 and Q2. (4 marks)
3. Determine whether the second-order condition for maximization is satisfied at $\overbar{Q}1$. (5 marks)
4. What is the maximum profit. (5 marks)