



# **MAASAI MARA UNIVERSITY**

**REGULAR UNIVERSITY EXAMINATIONS  
2022/2023 ACADEMIC YEAR  
FIRST YEAR SECOND SEMESTER**

**SCHOOL OF BUSINESS AND ECONOMICS  
BSC. AGRICULTURAL ECONOMICS RESOURCE  
MANAGEMENT, BSC. ECONOMICS, BSC.  
ECONOMICS AND STATISTICS, BSC. FINANCIAL  
ECONOMICS & BSC. AGRIBUSINESS  
MANAGEMENT.**

**COURSE CODE: ECO 1204-1**

**COURSE TITLE: MATHEMATICS FOR  
ECONOMISTS II**

**DATE: 21/4/2023**

**TIME: 0830-1030 HRS**

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**INSTRUCTIONS TO CANDIDATES**

1. Answer Question **ONE** and any other **TWO** questions

*This paper consists of **THREE** printed pages. Please turn over.*

### QUESTION ONE (20 MARKS)

a) A firm has the following production function and budget constraint respectively.

$$Q=K^{0.5}+L^{0.5}$$

$$K+4L=12$$

- i. Set up constrained output maximization problem from the given information **(2marks)**
  - ii. Determine the critical values of K,L and  $\lambda$  **(4 marks)**
  - iii. By applying the second order condition , confirm that the critical values of K and L present maximum Q **(3 marks)**
  - iv. Determine the stationary values of the lagrangian function **(2 marks)**
- b) If the utility function of an individual takes the form:

$$U = U(x_1, x_2) = (x_1 + 2)^2(x_2 + 3)^3$$

Where  $U$  is total utility, and  $x_1$  and  $x_2$  are the quantities of two commodities consumed.

- i. Find the marginal utility function of  $x_1$  and  $x_2$  **(3 marks)**
  - ii. Find the value of the marginal utility of the two commodities when 4 units of each commodity are consumed. **(3 marks)**
- c) Solve the definite integral **(3 Marks)**

$$\int_3^{10} \frac{1}{4} x^3 dx$$

### QUESTION TWO (15 MARKS)

- a) Find the derivative of the following function  $Y= (x+2y)^8$  **(5 Marks)**
- b) Define integration **(2marks)**
- c) The total revenue function is given by the following:  
 $TR=80\ln (Q+1)$

- i) Find the level of total revenue for
  - a) An output level of  $Q=200$  (2 Marks)
  - b) An output level of  $Q=450$  (2 Marks)
- ii) Given the following total cost
  - TC=3Q
  - a) Find the corresponding profit (2 Marks)
  - b) Find the level of profit corresponding to an output of  $Q=100$  (2 Marks)

### QUESTION THREE (15 MARKS)

- a) Consider the following demand and total cost functions

$$Q=10-0.5P$$

$$TC=2+20Q-8Q^2+Q^3$$

- i. What is the profit maximising output level?(4marks)
- ii. Show that at profit maximizing level of output  $MC=MR$ (3marks)

b)  $C=200+0.8Y^d$

$$Y^d = Y - T$$

$$T = 0.2Y$$

Find

- i. MPC (3marks)
- ii. MPS (3marks)
- iii. The saving function (2marks)

### QUESTION FOUR (15 MARKS)

- a) Determine whether the following function has a maximum and minimum. At what value of does the extremum point occur.(8 Marks)

$$Y=f(x) = (x-4)^4$$

- a) The demand curves of a price discriminating monopolist are defined by the following functions in two markets:

$$Q_1 = 17.5 - \frac{1}{4}P_1$$

$$Q_2 = 85 - 3P_2$$

If the monopolist's Total Cost Function is given as:

$$TC=70+9Q$$

- i. Determine the selling prices and quantities of Q in the two markets. **(5marks)**
- ii. What is the firm's profit? **(2 Marks)**

### **QUESTION FIVE (15 MARKS)**

- a) A farm faces the production function  $Q = 5K^{0.4}L^{0.6}$ . It can buy inputs K and L for KES 6000 and KES 450 respectively. The firm's output is constrained at  $Q=3000$ . Find the Least Cost Combination of K and L. **(6 Marks)**

- b) Consider the following total cost function

$$TC= 15Q^3+25Q^2+10Q+50$$

Find:

- i. The fixed cost **(1mark)**
- ii. The variable cost **(1mark)**
- iii. The average variable cost **(2marks)**
- iv. Find the level of Q at which the average cost are minimized. **(5marks)**

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