



# MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRIBUSINESS MANAGEMENT AND TRADE

SECOND YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT

AGB 203: AGRICULTURAL PRODUCTION ECONOMICS

DATE: 28/11/2019

TIME:8.30-10.30 AM

---

## INSTRUCTIONS:

Answer question one and two other questions

### SECTION A: 30 MARKS

#### QUESTION ONE (30 MARKS)

- a) Define the following terms:
- Capital (1 mark)
  - Marginal physical Product (1 mark)
  - Isoquant (1 mark)
  - Joint product (1 mark)
  - Returns to scale (1 mark)
- b) i) Use a sketch graph to differentiate fixed cost from variable cost (4 marks)
- ii) Given that the relationship between the yields from one acre of maize and the amount of Nitrogen(x) applied per acre of land is given by the following production function:
- $$Y=0.15x+0.001 x^2 -0.000005x^3$$
- Determine the yields of maize(Y) in Kg when 200 Kg of Nitrogen is applied in 1 acre (3 marks)
- c) i Explain the difference between technical efficiency and economic efficiency (3 marks)
- ii Explain the concept of profit maximization using a diagram (2 marks)

- d) i Describe three sources of diseconomies of scale in a farm that is involved in Maize production in Nyahururu. (3 marks)
- e) i Describe three characteristics of agriculture production (3 marks)
- ii Describe two sources of risk in agriculture production using a maize farmer in Kakamega as your point of reference (2 marks)
- iii Explain any two assumptions of a production functions (2 marks)

**SECTION B: 40 MARKS**

**QUESTION TWO: (20 MARKS)**

- a) i Given a production function  $y = 6x - 0.10x^2$ . Comment on the law of diminishing returns (5 marks)
- ii) Use a sketch to explain the difference between constant marginal returns and diminishing marginal returns (5 marks)
- b) Suppose that a production function is given by  
 $Y = 0.25x + 0.002x^2 - 0.000005x^3$   
 price is given by  $p = 5.00$  sh  
 Complete the given table (10 marks)

Input Fertilizer (Kg)	Total Physical Product(TPP)	Marginal physical product(MPP)	Average physical product(APP)	Value of marginal product (VMP)
20				
35				
40				
45				
50				

**QUESTION THREE (20 MARKS)**

- a) Given the following production function  $y = 0.38x + 0.0021x^2 - 0.000012x^3$
- i. Calculate the output maximizing level of nitrogen use (5 marks)
- ii. Calculate the profit maximizing level given that unit price of output is 4.00 sh (5 marks)
- b) Describe five conditions for profit maximization for a given production function (10 marks)

**QUESTION FOUR (20 MARKS)**

- a) Explain five factors that would influence the technological change in a farm (10 marks)
- b) Describe the relationship between adoption of technology and economies of scale(10 marks)

**QUESTION FIVE (20 MARKS)**

- a) Differentiate between the necessary and sufficient conditions for maximization using the function  $y = 10x_1 + 10x_2^2 - x_1^2 - x_2^2$ . (10 marks)
- b) Explain elasticity of factor substitution using a well labeled diagram (4 marks)
- c) Given the following production function:  $y = x_1^{0.5} + x_2^{0.5}$ . Calculate the Marginal rate of substitution (MRS) of  $x_1$  and  $x_2$  (6 marks)