LAIKIPIA UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

SECOND YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

AGE 222/AGEC 241: AGRICULTURAL PRODUCTION ECONOMICS

STREAM: ***BSC (AGED)*** ***TIME: 2 HRS***

DAY: ***WEDNESDAY [11.30 A.M-13.30 P.M]*** ***DATE: 28/01/2026***

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS:

Answer question one and any other two questions

QUESTION ONE

a) Briefly explain what production economics is concerned about and the key issues of any production problem. (**8 Marks)**

b) (i) Outline and explain assumptions in Production Economics **(6Marks)**

(ii) Using appropriate illustrations, distinguish between production functions with increasing and decreasing returns. **(4 Marks)**

c) A short-run farmers production function for tomatoes, *Y*, under a variable amount of fertilizer, *x* is given by:

$$Y = x + 30x^2 - x^3$$

i) For fertilizer quantities, x = 0, 5, 10, 15, 20, and 25, calculate the Total Physical Product (TPP), the Average Physical Product (APP), and the Marginal Physical Product (MPP) of tomatoes. **(6 Marks)**

ii) Using the APP, MPP, elasticities of production and appropriate illustrations, describe the three stages of production. **(6 Marks)**

QUESTION TWO

a) Describe increasing returns to scale, constant returns to scale and diminishing returns to scale. **(6 marks)**

b) An isoquant represents all possible combinations of two resources (x_1) and (x_2) physically capable of producing the same quantity of output. Briefly describe the main characteristics of isoquants. (**4 Marks**)

c) Discuss what is meant by the following production economics phrases:

i) Elasticity of production

ii) Necessary and sufficient condition for economic efficiency

iii) Expansion path

iv) Least cost combination

v) Marginal rate of technical substitution **(5 Marks**)

QUESTION THREE

a) Giving appropriate examples differentiate between economies of scale and diseconomies of scale in agricultural economics. **(4 Marks)**

b) Given that the total cost function to produce a certain agricultural commodity is:

$$TC = 10Y - 4Y^2 + Y^3$$

i) Find the average variable cost function **(2 marks)**

ii) Find the level of output, Y where the AVC is at the minimum **(4 marks)**

iii) Show that at the minimum of AVC, marginal cost function is equal to average cost function **(5 marks)**

QUESTION FOUR

a) What are the reasons for studying Product-Product Relationships? **(3 Marks)**

b) Suppose the production functions of oats, Y_1 and potatoes, Y_2 are given as $Y_1 = 65.54 + 1.84x - 0.003x^2$ and $Y_2 = 68.07 + 0.83x - 0.002x^2$, respectively:

i) Compute the combinations of oats and potatoes that can be produced if the farmer is limited to 10 units of the variable input. **(8 marks)**

ii) If the prices of oats and potatoes are KES 40 and 20 respectively, compute the profit maximizing outputs. **(4 marks)**

QUESTION FIVE

a) Suppose a given product whose production function is $Y = 18x_1 - x_1^2 + 14x_2 - x_2^2$ is produced using two inputs x_1 and x_2. The output price is KES 2 while the cost of inputs x_1 and x_2 are KES 8 and 4 respectively. Find the combination of two inputs that will maximize profit. **(5 marks)**

b) Suppose that 50 bags of beans can be produced using nitrogen and phosphate fertilizers. If the prices of nitrogen and phosphate fertilizers are equal, would it be correct to employ equal amounts of the two inputs to produce the 50 bags of beans? Using a well labelled diagram, explain your answer. **(10 marks)**