



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRIBUSINESS MANAGEMENT AND TRADE

SECOND YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (AGRIBUSINESS MANAGEMENT AND TRADE)

AGB 203: AGRICULTURAL PRODUCTION ECONOMICS

DATE: 18/8/2021

TIME: 8.30-10.30 AM

INSTRUCTIONS:

Answer **Question ONE** and **ANY TWO** other questions

QUESTION ONE (30 MARKS)

- a) Explain each of the following concepts as applied in agricultural production economics
- Isoquant (2 marks)
 - Expansion path (2 marks)
 - Marginal rate of technical substitution (2 marks)
 - Isocost line (2 marks)
- b) Suppose that the production function is given as $Y = 2X^{0.5}$. The price of X is Ksh.3 and the price of Y is Ksh.4.
- Determine the Value of Marginal Product (VMP) (1 mark)
 - Calculate the Average Value Product (AVP) (1 mark)
 - Determine the profit-maximizing level of input X (2 marks)
- c) Explain two causes of diminishing return in agricultural production (2 marks)
- d) Using an appropriate graphical illustration, explain the relation between production function and technology advancement (4 marks)
- e) Suppose the production function is $Y = 3X^{0.5}$, the price of input is Ksh. 10 and fixed cost are Ksh. 50. Given that $X=25$ determine;
- Average total cost (1 mark)
 - Average variable cost (1 mark)
 - Marginal cost (1 mark)

- f) Given that the quantity of output (Y) is a function of two variable input (X_1 and X_2), derive the expression that relates the Marginal Rate of Technical Substitution (MRTS) to Marginal Physical Product (MPP) of inputs X_1 and X_2 (4 marks)
- g) Citing relevant examples, explain the difference between risk and uncertainty in agricultural production (2 marks)
- h) Differentiate between the short-run and long-run periods in production citing relevant examples from agricultural production (3 marks)

QUESTION TWO (20 MARKS)

Suppose the production relationship between amount of Nitrogen fertilizer applied and the yield of maize is given by:

$$Y = 0.75X + 0.0042X^2 + 0.000023X^3$$

Where Y= maize yield in bags per Ha

X=nitrogen applied in Kg per Ha

- a) Determine the maize yield from 0kg of Nitrogen fertilizer to 240kg at an interval of 20kg (4 marks)
- b) Determine the Average Physical Product (APP) at the above average fertilizer application (3 marks)
- c) Determine the Marginal Physical Product (MPP) at the above average fertilizer application (3 marks)
- d) Graph the Total Product (TP), the Average Product (AP) and the Marginal Product (MP) curves of the above information on the same axis (4 marks)
- e) Briefly explain the three stages of production (6 marks)

QUESTION THREE (20 MARKS)

- a) Describe five sources of risk in agricultural production in Kenya (5 marks)
- b) Explain the strategies for dealing with risks and uncertainties in agricultural production in Kenya (5 marks)
- c) The following are the input combination of input X_1 and X_2 that can produce 10 units of output. The prices of X_1 is Ksh. 10 and that of X_2 is Ksh. 5. Determine the optimal input combination. (6 marks)

X_1	X_2
0	40
3	28
6	19
9	12
12	6
15	2
18	0

- d) Suppose there is a technology advancement that reduced the amount of X_2 required to produce 10 units of output by 50%, determine the new optimal input combination (4 marks)

QUESTION FOUR (20 MARKS)

- a) Using suitable diagrams discuss the terms production possibility curve, marginal rate of product substitution and Isorevenue line and show how they interact to determine the optimal product combination (6 marks)
- b) Using suitable diagrams describe the four types of product-product relationship encountered in agricultural production (8 marks)
- c) The following are the production function of two products (Y_1 and Y_2) with respect to a given input X_1 . The product prices of Y_1 is Ksh. 10 and that of Y_2 is Ksh. 5. Determine the possible product combination for 30 units of the input, then determine the optimal product combination. (6 marks)

X_1	Y_1	Y_2
0	0	0
5	7	11
10	13	20
15	18	28
20	22	35
25	25	41
30	27	46

QUESTION FIVE (20 MARKS)

- a) Discuss the three regions of production economic decisions that an agricultural extension officer would rather consider when giving advice to the small-scale farmers to boost their level of output using the available amount of input. (9 marks)
- b) Briefly discuss the three basic production decision faced by business firms. (6 marks)
- c) Given the following cost schedule, determine the optimal level of output when the product price is Ksh. 10. The firm is assumed to be operating in perfect competition. (5 marks)

Output quantity	0	2	4	6	8	10	12
Total cost	100	140	160	170	190	330	320