



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF AGRICULTURE, ENVIRONMENT AND HEALTH SCIENCES

DEPARTMENT OF AGRICULTURAL SCIENCES

SECOND YEAR SPECIAL / SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT

AGB 203: AGRICULTURAL PRODUCTION ECONOMICS

DATE: 31/8/2022

TIME: 2.00-4.00 PM

INSTRUCTIONS:

Answer question ONE and any other TWO questions

QUESTION ONE (30 MARKS)

- a) Discuss briefly the three basic production decision faced by business firms. (3 marks)
- b) Suppose that firm Z is aiming at maximising its profit and given that the amount of output is presented by the equation $(X^2 - 3X - 4)$ and the quantity price is Ksh 4. In addition, the unit factor cost of the inputs is Ksh 2 and the amount of input required by the firm is presented as $(X^2 + X - 2)$. Determine the level of output that maximizes the profit function of the firm Z (Show your working). (6 marks)
- c) Citing examples from agriculture distinguish between short-run and long-run periods in production. (4 marks)
- d) The following is a mathematical production function:
$$Y = 4X_1 \cdot X_2 - X_1^2 - 3X_2^2$$
Where Y=total product, and X_1 and X_2 are quantities of input 1 and 2
- i. Determine the marginal product of $X_1=5$ and $X_2=10$ (3 marks)
- ii. Determine the Average product of $X_1=5$ and $X_2=10$ (3 marks)
- e) Derive the relationship between marginal rate of technical substitution between two inputs and their marginal productivities (4 marks)
- f) Briefly discuss stage 2 (rational zone) of production (4 marks)
- g) Explain the law of diminishing returns citing example from agricultural production (3 marks)

QUESTION TWO (20 MARKS)

- a) As an Agricultural Extension Officer and a specialist in Agricultural Production Economics, **Discuss** the three regions of production economic decisions that you 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) Given the following labour production data

Labour	0	1	2	3	4	5	6	7	8	9	10
Output	0	10	24	42	56	62	66	69	71	71	69

- i. In Tabular form, derive the Average Physical Product (APP), Marginal Physical Product (MPP), Value of Average Physical Product (AVP) and Value of Marginal Physical Product (VMP). Given that the quantity price is Ksh 4 and the unit factor cost is Ksh 2. (6 marks)
- ii. When do diminishing returns set in? (3 marks)
- iii. What is the maximum production quantity? (2 marks)

QUESTION THREE (20 MARKS)

- a) Differentiate between the following concepts in production economics (9 marks)
- Marginal rate of technical substitution and marginal rate of product substitution
 - Isocost line and Isorevenue line
 - Isoquant and production possibility curve
- b) The following are the total products from three enterprises (Y_1 , Y_2 and Y_3) obtained from various quantities of a given input (X_1). $P_1=2$, $P_2=1$ and $P_3=1$, $C_1=4$ where P_1 , P_2 and P_3 are product prices and C_1 is the unit input cost.

X_1	Y_1	Y_2	Y_3
0	0	0	0
1	5	9	7
2	10	16	13
3	14	21	18
4	17	25	22
5	19	29	25
6	20	32	27

- i. Determine the optimal levels of each product given unlimited quantities of input X_1 (7 marks)
- ii. Determine optimal allocation of 4 units of input X_1 among the 3 products (4 marks)

QUESTION FOUR (20 MARKS)

- a) Using well labelled diagrams discuss the types of factors substitution in agricultural production economics (5 marks)
- b) A Coffee farmer believes that there is a 40% probability of reduced product prices in the next season and a 60% probability that reduction in prices will not occur. The farmer believes that the firm will earn profits of 60000 in the event of depressed prices and 125,000 if otherwise. What is the farmer's expected profit? (6 marks)
- c) The cost equation in a production of canned beef in a factory is given as follows:

$$C = 1000 + 100Q - 15Q^2 + Q^3$$

Where C is the total cost and Q is the quantity of beef produced. Determine average total cost, average variable cost, average fixed cost and marginal cost at 10 units of beef

(9 marks)

QUESTION FIVE (20 MARKS)

- a) Farmers all over the world face many situations in which the outcomes are uncertain. Citing relevant examples, discuss the sources of risk and uncertainties in agricultural production in Kenya (10 marks)
- b) The government and farmers have a number of strategies available for ameliorating the impact of risk and uncertainties. Discuss the strategies that can be taken to manage risk and uncertainties in agricultural production. (10 marks)