



PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES
SCHOOL OF AGRICULTURE AND NATURAL RESOURCES SCIENCES
DEPARTMENT OF AGRICULTURAL SCIENCES AND AGRIBUSINESS

QUALIFICATION: BACHELOR OF SCIENCE IN AGRICULTURE	
QUALIFICATION CODE: 07BAGA	LEVEL: 7
COURSE CODE: PPE621S	COURSE NAME: PRINCIPLES OF PRODUCTION ECONOMICS
SESSION: JUNE 2023	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	DR DAVID UCHEZUBA
MODERATOR:	DR THINAH MOYO

INSTRUCTIONS
<ol style="list-style-type: none">1. This paper consists of three sections: Section 1 has ten (10) multiple choice questions, section 2 is made up of ten (10) open fill-in-the-space questions, and Section three is the essay-type questions.2. Answer ALL questions in blue or black ink.3. Start each question on a new page in your answer booklet.4. Questions relating to this paper may be raised in the initial 30 minutes after the start of the examination. Thereafter, students must use their initiative to deal with any perceived error or ambiguities & any assumption made should be clearly stated.

THIS QUESTION PAPER CONSISTS OF 8 PAGES (Including this front page)

Section1 Multiple choice question (10 Marks)

Question 1

Which of the following statements is incorrect about the production horizon?

- A). The period of production for which inputs are engaged.
- B). The production period for which some costs are fixed.
- C). The production period for which all costs are variable.
- D). The production period for which no input is varied.

Question 2

Production activities that are independent of one another are known as

- A). Homoperiodic production
- B). Homothetic production
- C). Homogenous production
- D). Heterogenous production

Question 3

Which of the following is not a factor of production?

- A). Capital
- B). Skill
- C). Labour
- D). Wages

Question 4

Which of the following is not part of a producer's main objective?

- A). Minimise cost.
- B). Minimise risk.
- C) Maximise utility
- D) Maximise profit

Question 5

What is incorrect about the production function, $y = f(x_1, \dots, x_n)$,

- A). The function is a combination of only one input.
- B). The function f links input with output.
- C). The x s are a combination of input to produce output.
- D). The output is linearly related to the input.

Question 6

Which of the following statements is incorrect about the production function in Figure 1?

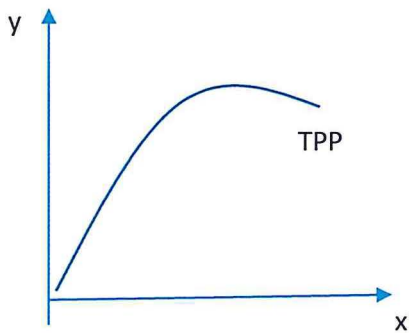


Figure 1. Production function

- A). It is a non-linear function.
- B). It is subject to the law of diminishing marginal returns.
- C). It has a constant return to scale.
- D). At maximum TPP, the rate of change of the output is zero.

Question 7

Find the value of output (TPP) for the following production function, $y = 4x^2 + 3x^3 - 16$ when the input level is 2 units.

- A).22
- B).24
- C).25
- D).20

Question 8

Suppose a production function is $y = x + 4x^2 - 3x^3$. Find the function for the average physical product.

- A). $y = 8x - 6x^2$
- B). $y = 1 + 8x + 6x^2$
- C). $y = 1 - 8x - 6x^2$
- D). $y = 1 + 8x - 6x^2$

Question 9

Which statement is incorrect? At the boundary of stage I and II,

- A). The total physical product is increasing at an increasing rate.
- B). The elasticity of production is equal to one.
- C). The marginal and average physical products are equal.
- D). The total physical product is increasing at a decreasing rate.

Question 10

Which of the following is correct about the total physical product (TPP) growth curve?

- A). It is concave to the horizontal axis before the inflexion point and convex to the horizontal axis after inflexion.
- B). It is convex to the horizontal axis before the inflexion point and concave to the horizontal axis at maximum TPP.
- C). It is concave to the horizontal axis before the inflexion point and concave to the horizontal axis at maximum TPP.
- D). It is convex to the horizontal axis before the inflexion point and convex to the horizontal axis at maximum TPP.

Section 2 Fill in the space questions (10 Marks)

1. If the 1st derivative of a TPP function is positive, the function _____
2. If the 1st derivative of a TPP function is negative, the function _____
3. If the 1st derivative of a TPP function is zero _____
4. If the 1st derivative of the TPP function is zero and the 2nd derivative is negative _____
5. If the 1st derivative of TPP function is zero, and the 2nd is positive _____
6. If both the 1st and 2nd derivative of TPP function are zero _____
7. If the 1st derivative of TPP function is zero and the 2nd derivative does not exist _____
8. If the 2nd derivative of the TPP function is positive _____
9. If the 2nd derivative of the TPP function is negative _____
10. If the 2nd derivative of the TPP function is zero _____

Section 3 Essay-type questions (80 Marks)

Question 1

Distinguish between the following; **(20 Marks)**

- 1.1. Function coefficient and partial elasticity of production. (2 Marks)
- 1.2. Economies and diseconomies of scale. (2 Marks)
- 1.3. Constant and increasing return to scale. (2 Marks)
- 1.4. Production and production function. (2 Marks)
- 1.5. Explain all the underlying assumptions of production economics. (12 Marks)

Question 2 **(20 Marks)**

- 2.1. Consider the following production function, $y = 10x + 20x^2 - 16x^3$. Derive a function for
 - 2.1.1. The average physical product. (2 Marks)
 - 2.1.2. The marginal physical product. (2 Marks)
- 2.2. At what level of input would the following reach maximum?
 - 2.2.1. The marginal physical product. (2 Marks)
 - 2.2.2. The average physical product. (2 Marks)
 - 2.2.3. The total physical product. (5 Marks)
- 2.3. Draw a graph to represent the production functions derived above and indicate the boundary of stage II and stage III. (5 Marks)
- 2.4. At what stage of the production is the elasticity of production equal to one? (1 Mark)
- 2.5. At what point on the production frontier does the law of diminishing returns kick in? (1 Mark)

Question 3 **(20 Marks)**

- 3.1. Given the demand function $p = 100 - 2Q$,
 - 3.1.1. Express total revenue as a function of quantity demanded (output). (2 Marks)
 - 3.1.2. For what value of output (Q) is the total revenue maximum? (2 Marks)
 - 3.1.3. What is the maximum value of total revenue? (2 Marks)
 - 3.1.4. Sketch a graph to show the output level and the total revenue. (2 Marks)

3.2. Given that the fixed costs are 1000 and the variable costs are 4 per unit and the demand function is given as

$$p = 10 - 2Q$$

3.2.1 Express the total cost as a function of the output (Q). (2 Marks)

3.2.2. Express total revenue as a function of output (Q). (2 Marks)

3.2.3. Express the profit as a function of output (Q). (2 Marks)

3.2.4. For what values of output does the firm break even? (2 Marks)

3.2.5. What is the maximum profit? (2 Marks)

3.2.6. Plot a graph to show the output levels, breakeven point and total profit. (2 Marks)

Question 4 (20 Marks)

4.1. Find the level of corn yield with four units of capital and three units of labour using the following production function.

4.1.1 $Y = K^{0.5} L^{1.2}$ (1 Mark)

4.1.2. $Y = K^{1.6} L^{0.8}$ (1 Mark)

4.2. The budget constraint of a Tomato farmer is N\$10000, per unit cost of fertiliser, is N\$40 and per unit cost of seed is N\$30.

4.2.1. Find the possible combination of the inputs that the farmer should utilise that gives the same cost outlay. (4 Marks)

4.2.2. Sketch the Isocost line. (2 Marks)

4.3. Find the necessary and sufficient conditions for the maximisation of the production functions.

$y = 10x_1 + 10x_2 - x_1^2 - x_2^2$ (4 Marks)

4.4. Check if these conditions in 4.3 are met. (2 Marks)

4.5. For the production function, $y = -2x_1 - 2x_2 - 2x_1^2 - x_2^2 + 10x_1x_2$, find,

4.5.1. f_1 (1 Mark)

4.5.2. f_{11} (1 Mark)

4.5.3. f_{12} (1 Mark)

4.5.4. f_2

(1 Mark)

4.5.5. f_{21}

(1 Mark)

4.5.6. f_{22}

(1 Mark)

END