



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF ECONOMICS AND STATISTICS

BACHELOR OF ECONOMICS

EET 300: MICROECONOMIC THEORY III

DATE: 20/1/2021

TIME: 8.30-10.30 AM

INSTRUCTIONS:

- (i) Answer question one (Compulsory) and any other two questions
- (ii) Do not write on the question paper
- (iii) Show your workings clearly

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Clearly distinguish between the following pairs of concepts. Make use of illustrations and diagrams as much as you can:
- i. Production Possibilities Set and Input requirement Set (3 marks)
 - ii. Roy's Identity and Shepherds Lemma (3 marks)
 - iii. Compensated Demand functions and Uncompensated Demand functions (3 marks)
 - iv. Cournot's equilibrium and Stackelberg's equilibrium (3 marks)
- b) In a duopoly market, the market demand and cost functions of the firms are given as:
- $$P = 100 - 0.5X, \text{ where } X = X_1 + X_2$$
- $$C_1 = 5X_1$$
- $$C_2 = 0.5X_2^2$$
- i. If firm 1 is a quantity leader, determine the equilibrium price and quantities in the market (4 marks)

- ii. Suppose firm 1 is a price leader, how would the answers in (i) above change? (4 marks)
- iii. Suppose the two firms decided to form a cartel and maximize their joint profits, determine the equilibrium price, quantities and profit in the market (6 marks)
- c) Explain **four** properties of a legitimate production function (4 marks)

QUESTION TWO (20 MARKS)

A consumer's indirect utility function is given as:

$$V(P, M) = (P_1^2 + P_2^2)^{0.5} M$$

Where P_1 and P_2 are prices of goods X_1 and X_2 , respectively and M is the consumer's Income.

- a) Derive the following:
 - i. The corresponding Expenditure function (3 marks)
 - ii. The uncompensated demand function for good X_1 (4 marks)
 - iii. The uncompensated demand function for good X_2 (3 marks)
- b) Using the functions above, state and demonstrate the Slutsky's equation. (10 marks)

QUESTION THREE (20 MARKS)

- a) Consider an industry with the following structure. There are 50 firms that behave in a competitive manner and have identical cost functions given by:

$$c(y) = \frac{y^2}{2}$$

The demand for the product is given by $D(P) = 1000 - 50P$

- i. What is the total supply from the market? (3 marks)
- ii. What is the equilibrium price and quantity in the competitive market? (2 marks)
- b) What is elasticity of substitution? Compute the elasticity of substitution for the following function. (5 marks)

$$Q = AL^\alpha K^\beta$$

- c) Given the firm's production function as $y = AL^\alpha K^{1-\alpha}$

Let w be the price of labour and r the price of capital. So that the firm's expression of the cost equation is given as $C = wL + rK$

Derive the corresponding cost function. (10 marks)

QUESTION FOUR (20 MARKS)

- a) A short run production function is given as $Q = X^{0.5}$, where Q is the output and X is the input. Is the production function concave? Show your working. (4 marks)
- b) Let p represent the output price and w represent the input price. Derive the firm's profit function. (8 marks)
- c) Is the profit function derived legitimate? Show your working. (8 marks)

QUESTION FIVE (20 MARKS)

- a) Given the following cost function,:

$C(w_1, w_2, y) = 10w_1^{\frac{1}{3}}w_2^{\frac{2}{3}}y$, where y is the output and w_1 and w_2 are the prices of two inputs x_1 and x_2 respectively. Check whether the cost function satisfies the properties of a cost function. (7 marks)

- b) From the cost function in a) determine the underlying production function. (7 marks)

- c) Given the indirect utility function $V(p, m) = \frac{m^2}{4p_1p_2}$

Demonstrate the properties of indirect utility functions. (6 marks)