



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF ECONOMICS AND STATISTICS

BACHELOR OF ECONOMICS AND FINANCE

BACHELOR OF ECONOMICS

EET 300: MICROECONOMIC THEORY III

DATE: 24/3/2021

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) 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. Compute the cournot equilibrium price and quantity (5 marks)
 - ii. If firm 1 is a quantity leader, determine the equilibrium price and quantities in the market (5 marks)
- b) Using relevant illustrations explain **four** types of production functions (8 marks)
- c) Given the indirect utility function $V(p, m) = \frac{m^2}{4p_1p_2}$
- i. Demonstrate the properties of indirect utility functions. (6 marks)
 - ii. Compute the corresponding compensated and uncompensated demand functions (6 marks)

QUESTION TWO (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 THREE (20 MARKS)

- a) The objective of a rational consumer is to obtain the highest possible utility. Suppose a consumer seeks to maximize utility given by the following function:

$$u = x_1 x_2$$

Required:

- i. The Marshallian demand functions (6 marks)
- ii. The Hicksian demand functions (4 marks)
- iii. The consumer's expenditure function (4 marks)
- b) Explain the characteristics of a legitimate production function (6 marks)

QUESTION FOUR (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 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. (10 marks)

b) From the cost function in a) determine the underlying production function. (10 marks)