

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF MASTER IN AGRICULTURAL ECONOMICS

AGEC 801: MICROECONOMICS THEORY

STREAMS: MSC AGEC

TIME: 3 HOURS

DAY/DATE: MONDAY 6/08/2018

2.30 P.M - 5.30 P.M.

INSTRUCTIONS:

- Answers question ONE and any other THREE Questions
- Question ONE carries 30 Marks and the rest 10 Marks each
- Show all your working

1. (a) For each of the following statements, answer whether they are **TRUE**, **FALSE** or **UNKNOWN**. Note, you **MUST ILLUSTRATE** your answer.
 - (i) Profit maximization and cost minimizing firms at the optimal level will equate the ratio of marginal products of factors involved in production with the respective ratio of inputs prices. [2 Marks]
 - (ii) The expenditure function is an increasing function of both prices and a given utility level. [2 Marks]
 - (iii) The optimal profit function is non-increasing in output price and non-decreasing in factor prices. [2 Marks]
- (b) Draw level curves (indifference or isoquant curves) for the following situations;
 - (i) A situation a housewife makes porridge using polluted water (which she is supposed to purify) and quality millet flour. [2 Marks]
 - (ii) A production process in which the factors of production are being used in fixed production. [2 Marks]
 - (iii) A situation where policy maker faces inflation and unemployment rates as choice variables. [2 Marks]

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(iv) A consumer's preference relation for which the elasticity of substitution between consumer goods is equal to unity. [2 Marks]

(c) Consider the following cost function of a firm:

$$C = W_1^\alpha W_2 Y$$

Where W_1 and W_2 are input prices and Y is specified level output.

(i) Derive expressions for conditional demand functions for inputs 1 and 2. [2 Marks]

(ii) Show that the production function that underlies the Cobb-Douglas cost function is of the C-D form. [4 Marks]

(iii) Using your own example, illustrate a practical application of the above cost function. [1 Mark]

(d) A consumer has an indirect utility $V(P_1, P_2, W) = \frac{W}{P_1} - \frac{P_2}{W}$, where P_1 and P_2 are the price of good 1 and good 2 and W is the consumer's wealth.

(i) Show that the function satisfies the following properties: Homogenous of degree zero in wealth and prices, increasing in wealth and non increasing in prices. [6 Marks]

(ii) Drive the consumer's Walrasian demand function. [3 Marks]

2. A producer has a cost function: $c(w_1, w_2, q) = q[w_1^r + w_2^r]^{\frac{1}{r}}$, where w_1 and w_2 are the price of factor 1 and factor 2, q is the output, p is the output price. What are the producer's conditional factor demand function, production function, profit function and demand (supply) function? [10 Marks]

3. (a) Suppose Gimzo Brothers, Inc, produces two types of hi-tech yo-yo; the Exterminator and Eliminator. Denoting Exterminator output as Q_1 and Eliminator output as Q_2 , the company has estimated the following demand equations for its yo-yos.

$$Q_1 = 10 - 0.2P_1 - 0.4Q_2$$

$$Q_2 = 20 - 0.5P_2 - 2Q_1$$

The total cost equations for producing Exterminator and Eliminators are

$$TC_1 = 4 + Q_1^2$$

$$TC_2 = 8 + 6Q_2^2$$

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- (i) If Gimzo Brothers is a profit-maximizing firm, how much should it charge for Exterminators and Eliminators? [2 Marks]
- (ii) What is the profit maximizing level of output of Exterminators and Eliminators? [2 Marks]
- (iii) What is the Gimzo Brothers profit? [2 Marks]
- (b) The total cost of Chege's workshop at Kibera Ayany area is $TC = 100 + 4Q + 8Q^2$. What is the marginal cost when output is 10 and 20? Calculate the average costs also when output is 10 and 20 respectively. [4 Marks]

4. (a) A firm's long run total cost (LRTC) = $2000Q - 5Q^2 + 0.005 Q^3$
- (i) What is firm's long run average cost equation? [1 Mark]
- (ii) What is the firm's minimum efficient scale of production? [2 Marks]

(b) A production function for a firm has the following relationship between the level of output (Q) and the level of capital (K) and labour (L).

$$Q = 4KL + 3L^2 - \left(\frac{1}{3}\right) L^3.$$

- (i) Find the isoquant equation for $Q = 100$ [3 Marks]
- (ii) Derive the expression of function that gives the slope of the isoquant. [1 Mark]
- (iii) Derive the marginal product for labour function from the preceding production function if K is fixed at five (5) units. [1 Mark]
- (iv) If K is fixed at five (5) units where do diminishing returns to labour set in? [2 Marks]
5. Consumer A and Consumer B have the following utility functions:

$$\text{Consumer A: } U_A = X_A Y_A \quad \text{and Consumer B: } U_B = X_B Y_B$$

$$\text{The initial endowments are: } \acute{X} A = 90, \acute{Y} A = 35, \acute{X} B = 30, \acute{Y} B = 25$$

- (i) Find the market-clearing equilibrium conditions. [1 Marks]
- (ii) Find the budge constraint (Note normalize the price of good Y to be unity i.e. $P_y = 1$) [1 Marks]

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(iii) Calculate the demand function for good X and Y for Consumer A. [3 Marks]

(iv) Calculate the demand function for X and Y for consumer B. [3 Marks]

(v) Solve for the competitive equilibrium allocation. [2 Marks]

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