



UNIVERSITY OF EMBU

2016/2017 ACADEMIC YEAR

FIRST SEMESTER EXAMINATION

FOURTH YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE
IN AGRIBUSINESS MANAGEMENT AND BACHELOR OF SCIENCE IN
AGRICULTURE (ECONOMICS OPTION)

AEB 411/AEC 309:INTERMEDIATE MICROECONOMICS

DATE: DECEMBER 5, 2016

TIME: 8:30-10:30AM

INSTRUCTIONS:

Answer Question ONE and ANY Other TWO Questions

QUESTION ONE (30 MARKS)

- a) Using the theory of consumer behavior to illustrate, distinguish between the direct and indirect approaches to verification of economic models using scientific enquiries or research (4 marks)
- b) Compute the f_x and f_y of the following function:
 $f(x,y) = 2x+4y+x^2+\ln(x^2+y^2)$ (2 marks)
- c) Suppose that $f(x,y) = xy$. Find the maximum value of f if x and y are constrained to sum to 1. (2 marks)

- d) Explain the ordinal approach to measuring consumer utility and why the approach has been found to explain the consumer behavior better than the cardinal approach (4 marks)
- e) Suppose the production function for a given output during a particular period can be represented by $q = f(k,l) = 600k^2l^2 - k^3l^3$
- i. Determine the following MP_k and MP_l at $k=20$ and $l=10$ (2 marks)
 - ii. Determine the MRTS of k for l at the levels given above and interpret the results (2 marks)
- f) Distinguish between the very short-run market period and the short-run market period used in determining prices in perfect competitive model (5 marks)
- g) Discuss the 3 basic elements of the game theory and their relevance in modeling the strategic interactions among two or more economic agents (5 marks)
- h) Using relevant illustrations distinguish between efficiency in exchange and efficiency in production (4 marks)

QUESTION TWO (20 MARKS)

- a) A researcher seeks to evaluate the effect of government policy on the efficiency of milk production in Kenya. Discuss the 3 basic features of the model that the researcher will construct (6 marks)
- b) Suppose the health (y) of a patient depends on daily doses of 2 health enhancing drugs (x_1 and x_2) in a relationship given below:
- $$y = -x_1^2 + 2x_1 - x_2^2 + 4x_2 + 5$$
- Determine the following:
- i) The values of x_1 and x_2 that would maximize the health of the patient (2 marks)
 - ii) The value of the patient's health at the optimal doses of the two drugs (2 marks)

- iii) The values of x_1 and x_2 if the two drugs are constrained by the fact that the patient can only tolerate one drug dose per day (4 marks)
- iv) Determine the value of the patient's health at the constrained optimal doses and explain the difference with the answer found in (ii) above (2 marks)
- c) Suppose that the relationship between profits (π) and quantity produced (q) is given by the following function:

$$\Pi = 1000q - 5q^2$$

Determine the following:

- i) Quantity of output that maximizes profit (2 marks)
- ii) The value of maximum profit (1 mark)
- iii) Whether the quantity determined is a maximum or a minimum (1 mark)

QUESTION THREE (20 MARKS)

- a) Explain the following concepts in consumer theory:
- i) Utility functions (2 marks)
- ii) Indifference curve (3 marks)
- b) The utility derived from consuming 2 goods (X_1 and X_2) is given by the following function:
- $$U(X_1, X_2) = X_1^{0.5} X_2^{0.5}$$
- Given $I=100$, $P_1=5$ and $P_2=10$, where I is income, P_1 and P_2 are prices of X_1 and X_2 respectively, determine the quantities of X_1 and X_2 that maximize utility and the level of maximum utility (5 marks)
- c) An economic analyst sought to study the choice of agricultural goods by individual consumers in Embu Municipal Market. Discuss the axioms that characterize rational consumer behavior, which the analyst must assume in the study (10 marks)

QUESTION FOUR (20 MARKS)

- a) Explain the following concepts in the theory of the firm citing examples from agricultural production:

- i) Marginal productivity (2 marks)
- ii) Average productivity (2 marks)
- iii) Diminishing marginal productivity (2 marks)
- iv) Isoquant (2 marks)
- v) Marginal rate of technical substitution (2 marks)

b) An agribusiness firm contracts two firms to produce office chairs. Each firm produces identical chairs, and each has a production function given by:

$$Q_i = \sqrt{K_i L_i}$$

$i = 1, 2$; Q = number of chairs; K = quantity of capital and L = quantity of labor

The firms differ, however, in the amount of capital equipment each has. In particular, firm 1 has $K_1 = 25$, whereas firm 2 has $K_2 = 100$. Rental rates for K and L are given by $w = v = 1$.

- i) If the agribusiness firm wishes to minimize short-run total costs of office chairs production, how should output be allocated between the two contracted firms? (2 marks)
- ii) Given that output is optimally allocated between the two farms, calculate the short-run total, average, and marginal cost curves (4 marks)
- iii) Compute the marginal cost of the 100th and 125th chair (2 marks)
- iv) How should the entrepreneur allocate chair production between the two firms in the long-run? Calculate the long-run total, average, and marginal cost curves for chair production (2 marks)

QUESTION FIVE (20 MARKS)

- a) Use of empirical research to develop models that explain increasingly complex aspects of economic behavior has expanded rapidly in the last few decades. Discuss the major developments in economic modeling since World War II (10 marks)
- b) The following are individual demand functions for oranges:

$$X_1 = 10 - 2P_X + 0.1 I_2 + 0.5P_Y$$

$$X_2 = 17 - P_X + 0.05 I_2 + 0.5P_Y$$

P_X = Price of oranges, P_Y =Price of a substitute good, I_1 =individual 1 income,
 I_2 =individual 2 income, X_1 =Individual 1 quantity demanded, X_2 =Individual 2 quantity
demanded

Assuming a market comprising the two individuals, answer the questions below:

- i) Determine the market demand function, given $I_1=40$, $I_2=20$ and $P_Y=4$ (1 mark)
- ii) Graph a market demand curve for oranges (4 marks)
- iii) Determine the market demand if the price of the substitute was to rise to $P_Y=6$
(1 mark)
- iv) Draw the new demand curve to show shift in demand (4 marks)
- v) The supply function of oranges in the very short run is given by: $X_S=20$. Determine
the short run equilibrium price at $P_Y=4$ and $P_Y=6$ (2 marks)

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