

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2014/2015**

 **YEAR 2 SEMESTER I EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE AERD**

**AER 2205: AGRICULTURAL PRODUCTION ECONOMICS**

**DATE: April 2015 TIME: 2 HOURS**

**INSTRUCTIONS: Answer All Questions in Section A and Any Two In Section B**

**SECTION A: ANSWER ALL QUESTIONS**

1. a. The law of diminishing returns cannot apply in the long run. True or False? Explain. (4marks)

b. Distinguish between the following paired terms:

1. Returns to scale verses economies of scale
2. Elasticity of production verses elasticity of substitution
3. Allocative efficiency verses technical efficiency (6marks)
4. a. A production function is given by $y=0.85x^{α}$

 Mathematically show that α is the elasticity of substitution. (3marks)

b. Is it possible for a technology to exhibit constant returns to scale and diminishing marginal product? Explain your answer. (4marks)

c. For each of the following production functions, identify which one(s) exhibit the law of variable proportions:

1. $y=\sqrt{x}$
2. $y=3x$
3. $y=x^{3}$
4. $y=6x-0.5x^{2}$

Explain your answer. (4marks)

d. Given the production function $y=Ax\_{1}^{0.5}x\_{2}^{0.5}$

 Comment whether the function exhibits constant increasing or diminishing returns to scale. Explain your choice. (4marks)

1. A common observation is that many smallholder farmers continue to grow food crops despite the availability of high value commercial crop enterprises. Are such farmers irrational? Discuss**.** (10marks)
2. a. Using a graphical illustration of the classical production function, explain the relationship that exist between the elasticity of production (EP) and the stages of production. (6marks)

b. Explain briefly any four properties of a well behaved isoquant (2marks)

c. Given the production possibility frontier $y\_{1}=100-0.0065y\_{2}^{2}$and that $Py\_{1}$=5 and $Py\_{2}=6$

 Calculate the optimum combination of $y\_{1}$and $y\_{2}$ that can be obtained from the production process. (7marks)

1. a. Mathematically show the relationship between the marginal rate of technical substitution and the marginal physical product. (4marks)

b. Given the production function $y=x\_{1}^{0.5}x\_{2}^{0.34}$

 Calculate the marginal rate of technical substitution (MRTS) when $x\_{1}=3$ and $x\_{2}=2$ (4marks)

c. Exhaustively distinguish between Returns to scale and economies of size. (2marks)

**SECTION B: ANSWER ANY TWO QUESTIONS**

1. a. Given $y=0.75+0.0042x^{2}+0.000023x^{3}$
2. Determine the level of input use where stage 1 ends (3marks)
3. Calculate the level of output where stage II ends (3marks)

b. Give and explain briefly at least two examples in each case where;

1. Agricultural production is carried out in stage I of the production function. (4marks)
2. Agricultural production is carried out in stage II of the production function (4marks)

c. i. Given the production function in (a) above, determine the level of output that will maximize profits if the price of output $P\_{y}=20$ and the price of input $P\_{x}=0.40$ (6marks)

 ii. Determine the maximum profits. (4marks)

1. Assuming a producer has a total outlay of Ksh1000 that he wants to spend in a production process. If the production technology is described by the production function $y=x\_{1}x\_{2}$ and the price of $x\_{1}$ is Ksh2 and the price of $x\_{2}$ is Ksh1

Required

Determine the least cost combination of $x\_{1}$ and $x\_{2}$ that will produce optimum level of output. (20marks)

1. The production function of a firm is given by

$Q=80+K^{0.5}L^{0.5}$and the corresponding cost function is given by $C=2L+2K$ if the firm wishes to minimize the cost for a specified level of output $Q\_{0}=88:$

Required;

1. Specify the firm’s constrained cost minimization problem. (4marks)
2. Construct the corresponding largragian function (4marks)
3. What are the critical values of L and K? (12marks)