CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS

AGEC 841: AGRICULTURAL PRODUCTION ECONOMICS

STREAMS: MSC AGBM Y1S1   **TIME: 2 HOURS**

DAY/DATE: TUESDAY 04/12/2018   **2.30 P.M. – 4.30 P.M.**

INSTRUCTIONS:
- **Answer all questions in section A and any three in section B**
- **Answer each question on separate pages**

SECTION A

SECTION A: ANSWER ALL QUESTIONS (25 MARKS)

1.   (a)   Describe the nature of agricultural production systems and illustrate how these systems are different from other contemporary production systems. (10 marks)

      (b)   Describe the measure that a typical farming household can embark in order to reduce risks and uncertainty associated with the agricultural production.
                                                                              (10 marks)
      (c)   Discuss the following production functions.

             (i)   Spillman   (2 marks)
             (ii)   Cobb Douglas   (1 mark)
             (iii)   Transcendental   (2 marks)

SECTION B: ANSWER ANY THREE QUESTIONS (45 MARKS)

2.   (a)   Suppose instead that the relationship between the amount of nitrogen that is applied and corn yield is described as
$$y = 0.75x + 0.004x^2 - 0.000023x^3$$
             Calculate the corn yield for the following levels of production.   (5 marks)

Quantity of Nitrogen (Kg/Acre)	Yield of corn (90 kg Bags/Acre)
0	
40	
80	
120	
160	
200	
240	

(b)   Calculate the marginal physical products and the average physical products at each level of production.   (5 marks)

(c)   Discuss the necessary and the sufficient conditions for maximizing profits as dictated by the neoclassical production function.   (5 marks)

3.   (a)   Suppose that the production function is given by $y = 2x^{0.5}$ The price of x is Ksh 3 and the prie of y is Ksh 4.

(i)   Derive the corresponding VMP and AVP functions.   (5 marks)

(ii)   Solve for the profit-maximizing level for input use x .   (5 marks)

(b)   The information below was obtained from a 5-hectare farm in Karieni with 2 hectares under maize, 1.4 hectares wheat, 1 hectare beans and 0.6 hectare dairy.

Enterprise	Gross output Ksh	Variable cost Kshs/ha
Maize	1000	500
Wheat	1500	750
Beans	800	300
Dairy	2500	1000
Total	5800	2550

Compute the gross-margin
(i)   For each enterprise   (2 marks)
(ii)   For the whole farm   (3 marks)

4.   (a)   Suppose that the production function is $y = 3x^{0.5}$. The price of the input is Kshs 3. Per unit, and total fixed costs are Kshs 50. Find and graph the functions that

Represent: MPP, APP, AVC, AC (or ATC), MC   (5 marks)

    (b)   Suppose that the output price is Kshs 5. Find AVP, VMP and MFC.   (5 marks)

    (c)   Using the data contained in problem above, find the profit-maximizing level of input use by equating VMP and MFC.   (5 marks)

5.   (a)   Given the following input combination for the production of product A. Calculate the $MRTS_{X1,X_2}$ and $MTRS_{X_2,X_1}$ Describe the type of technical substitution in each   case.
            (5 marks)

X1	X2
0	50
5	40
10	30
15	20
20	10
25	0

    (b)   Suppose that a production function is given by $y = x_1^{0.5} x_2^{0.3}$

    (i)   Set up a Lagrangean optimization problem using this production function. Derive first order conditions.   (4 marks)

    (ii)   Suppose that the output, y, sells for Kshs 4.00 per unit and that x1 and x2 both sell for Ksh. 0.10 per unit? How much x1 and x2 would the farmer purchase in order to maximize profit.   (6 marks)