BINDURA UNIVERSITY OF SCIENCE EDUCATION

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FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

AGM 222

Department of Agricultural Economics, Education and Extension
BSc Agricultural Science (Honours) Part 1V Examination
AGRICULTURAL PRODUCTION ECONOMICS

3 HOURS (100 Marks)

MAY 2024

INSTRUCTIONS

Answer any ***FOUR*** questions. Each question carries **25 marks.**

1. The production function of a firm is given as follows: $100L^{0.5}K^{0.5}$. It is also given that K = 100 and price of output is $2 per unit, wage rate of labour is $50 and rental cost of capital is $40 per machine hour.
   a. Determine the quantity of labour the firm should hire to maximise profits. **[10 marks]**
   b. Calculate the maximum profits of the firm. **[15 marks]**

2. With the aid of diagrams, explain the following terms:
   a. Technical efficiency **[5 marks]**
   b. Allocative Efficiency **[5 marks]**
   c. Economic efficiency **[10 marks]**
   d. Expansion path **[5 marks]**

3. Given the following production function and cost equation:
   $Q = L^{1/2}K^{1/2}$, $C = wL + rK$
   Derive the long-run cost function. **[25 marks]**

4. When the regression was calculated (using a software package), the following results were generated:

log a = -.13489	R^2 = .98895
L = .825054	t statistic for L = 2.522783
K = .345781	t statistic for K = 2.194156

   a) Fit a Cobb-Douglas Production Function. **[5 marks]**
   b) Calculate returns to scale and advise the farmer. **[10 marks]**

c) Comment on the:

i) Marginal product of labour and **[5 marks]**

ii) Appropriateness of the fitted production function. **[5 marks]**

5. Suppose there are two farmers, Mawadze and Gaza. Both farmers produce two goods, maize and wheat. Furthermore, assume that both farmers have linear production possibility frontiers (PPFs). The following table provides information about the amount of labor necessary to produce one tone of maize or one tone of wheat. Assume that Mawadze and Gaza both have a total of 120 hours of labor available to devote to the production of maize and wheat.
Hint: put maize (M) on the vertical axis and wheat (W) on the horizontal axis

	Labor needed to produce one tone of maize	Labor needed to produce one tone of wheat
Mawadze	2 hours of labor	10 hours of labor
Gaza	4 hours of labor	12 hours of labor

a. Given the above information, write an equation that represents Mawadze's PPF. In your equation maize and wheat should be abbreviated as M and W respectively. **[5 marks]**

b. Suppose that the amount of labor available for the production of maize and wheat is now 60 hours. You are told that Gaza is currently producing on his PPF and is producing 3 tonnes of wheat. Calculate how many tones of maize Gaza is producing. **[5 marks]**

c. Given the initial information about Mawadze and Gaza, suppose these two farmers decide to specialize and trade with one another. Calculate the acceptable range of prices in terms of wheat that 10 tonnes of maize will trade for. Show your work. Make sure your answer is clearly labeled. **[5 marks]**

d. Construct a PPF that illustrates the combined production possibility frontier for these two farmers. If the PPF has different linear segments identify the coordinates of the endpoints for any segment. Label your graph carefully and completely. Measure maize (M) on the vertical axis and wheat (W) on the horizontal axis. **[10 marks]**

6. According to a September 27, 2007, article in the Agribusiness Journal, Energy is an input into virtually all types of production; maize is an input into the production of beef and chicken.

a) Explain how the cost of energy can be both a fixed cost and variable cost for a farmer. **[7 marks]**

b) Suppose energy is a fixed cost and energy prices rise. Explain what happens to the farmer's average total cost curve and marginal cost curve. Illustrate your answer with a diagram. **[8 marks]**

c) Explain why the cost of maize is a variable cost but not a fixed cost for a beef producer. **[5 marks]**

d) When the cost of maize goes up, explain what happens to the average total cost curve of a beef producer. Illustrate your answer with a graph. **[5 marks]**

End of Paper