

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL EARTH AND ENVIRONMENTAL SCIENCES
DISCIPLINE OF AGRICULTURAL ECONOMICS
EXAMINATIONS: NOVEMBER 2013

SUBJECT, COURSE AND CODE: **AGRICULTURAL PRODUCTION ECONOMICS AND
PRICE ANALYSIS – AGECE 370**

DURATION: 3 HOURS

TOTAL MARKS: 100

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External Examiner: Dr SRD Ferrer

**NOTE: THIS PAPER CONSISTS OF 7 PAGES. PLEASE SEE THAT YOU HAVE ALL OF THEM.
PLEASE ANSWER SECTION A AND SECTION B IN SEPARATE BOOKS**

INSTRUCTION: Students are to answer **ALL** questions in both **Sections A and B**, and are required in their own interest to write legibly.

SECTION A: PRODUCTION ECONOMICS

QUESTION 1

Indicate whether the following statements are **TRUE or FALSE**, **GIVING REASONS** for each of your answers (use diagrams and calculations to support your answers where appropriate).

- 1.1 Stages I and III of the classical production function are irrational stages in agricultural production process. (2)
- 1.2 If capital is limiting, the VMP of each variable input tends to be lower than its price when profit is at its maximum attainable level. (2)
- 1.3 A profit maximizing farmer who produces two products, will, if possible, produce where the relationship between the products is complementary. (2)
- 1.4 The law of diminishing marginal returns explains why most production possibility curves (frontiers) are concave to the origin. (2)
- 1.5 If a production function exhibits an increasing economic returns to scale the producer should scale up his/her farm operation. (2)
- 1.6 A risk-averse farmer will always be indifferent between two enterprises that yield the same expected profit. (2)
- 1.7 Risk (measured as variation in net farm income) will always be reduced by diversifying the enterprise mix. (2)

- 1.8 Economies or diseconomies of size refer to the impact of output expansion on average costs. (2)
[16]

QUESTION 2

The following production function has been estimated for wheat:

$$W = 4F^{0.5} \cdot L^{0.25}$$

where, W = Wheat yield (kg/ha), F = Fertiliser (kg/ha) and L = Labour (hours/ha)

- 2.1 What is the elasticity of production for fertiliser and labour, and the return to scale in wheat production? How are these estimates interpreted? (3)
- 2.2 Derive an expression for the least-cost expansion path given that fertiliser costs R12 per kg and labour costs R6 per hour. (4)
- 2.3 If the wheat producer has a budget of R9 000 to spend on fertiliser and labour, how much of each input should he use and what is the quantity of wheat he will produce? (4)
- 2.4 Derive expressions for the value of marginal product (VMP) of fertiliser and labour given that wheat sells at R72 per kg. (3)
- 2.5 Does the capital constraint of R9 000 result in underutilization of both fertiliser and labour? Explain. (2)
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QUESTION 3

Ms Gabese who is farming in rural Msinga, is considering three cereal enterprises - maize, millet and sorghum during the coming farming season. She is concerned about the risk (i.e. variability in gross margin per hectare), of growing these crops and would like to establish a risk-efficient combination of these crops. She obtained the following real gross margin data over five years from her neighbouring farmer:

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	Real Gross Margins (R/Ha)		
Year	Maize	Millet	Sorghum
2008	800	900	-1000
2009	-600	800	1200
2010	1000	-500	700
2011	-100	400	300
2012	700	-200	900

Ms Gabese has 100 hectares of arable land available for growing these crops. Labour is limited to 5 000 hours per season and capital to R400 000. Maize requires 50 labour hours and R4 000 capital per hectare; Millet 30 labour hours and R2 000 capital per hectare and Sorghum 60 labour hours and R5 000 capital per hectare.

- 3.1 Express the problem of minimising risk (deviations in gross margins) for a given level of farm gross margin as a MOTAD model in matrix format, taking all available data into account. (10)
- 3.2 Distinguish between economies of size and economies of scale. How can a plant gain economies of size or have diseconomies of size? (8)

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SECTION B: PRICE ANALYSIS

QUESTION 4

Indicate whether the following statements are **TRUE or FALSE**, **GIVING REASONS** for each of your answers (use diagrams to aid your answers where appropriate):

- 4.1 Paasche index understates price increases and overstates price decreases. (3)
- 4.2 If an agricultural input (eg. fertilizer) has an inelastic supply curve, the main effect of a change in the price of the product using that input (eg. wheat) will be on the quantity of the input used. (3)
- 4.3 It is relative prices, not absolute prices, that affect farm production, consumption and investment decisions. (2)
- 4.4 If a commodity has perfectly inelastic demand at R25/unit, quantity demanded is infinite at any price below R25/unit. (2)
- 4.5 A profit maximizing monopolist sets prices in the range of the demand curve that is price elastic. (2)
- 4.6 When a country imposing a tariff is a 'small country', all of the tax is paid by the consumers of the importing country. (2)
- 4.7 Income and price figures are deflated to account for the volatility of the South African currency. (2)
- 4.8 The lower are the own price elasticities of demand and supply in the exporting country, the more the fall in prices in the exporting country due to an increase in import tariff on the good in the importing country. (2)

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QUESTION 5

Answer the following questions concisely and completely.

- 5.1 Many studies have shown that agricultural producers are unlikely to adjust their supply decisions instantaneously in response to an increase in the price of agricultural products. How would you justify this? (4)
- 5.2 Explain the following concepts / principles in your own words. Relate your explanations to agricultural price analysis
- 5.2.1 Import parity price (2)
- 5.2.2 Price discrimination (2)
- 5.3 The demand for an agricultural input is a function of the marginal product of the input and the price of the output produced using the input. Explain. (3)
- 5.4 Suppose the base year is 2008 and the real producer price for wheat in 2008 is 140 (in Rands per unit). Its current (2013) producer price (in Rands per unit) is 160 and the real producer price (in Rands per unit) is 150. How would you interpret these figures? (4)

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QUESTION 6

The following questions might need calculations and interpretations, please show all necessary steps which lead to your final answer and interpret your results.

- 6.1 A double-log demand function has been estimated for pork consumption in South Africa. The demand function was estimated from 40 annual observations using Ordinary Least Squares (OLS) regression. The following is an extract from the printout:

LQ_P = log of pork consumption (kg/capita) = Dependent variable

LP_P = log of real beef price (R/kg) = Explanatory variable

LP_B = log of real beef price (R/kg) = Explanatory variable

LP_C = log of real chicken price (R/kg) = Explanatory variable

LY = log of real income (R/capita) = Explanatory variable

Analysis of Variance

<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-value</u>	<u>Sig. F</u>	
Regression	4	4200	1050	22.98	0.001
Residual	35	1600	45.714		
$R^2 = 0.724$		Adjusted $R^2 = 0.67$			

Variables in the Equation

<u>Label</u>	<u>Coefficient</u>	<u>Standard Error</u>	<u>t-value</u>	<u>Sig. t</u>
CONSTANT	-0.52	0.571	-0.911	0.280
LP _P	-1.79	0.342	-5.234	0.003
LP _B	0.35	0.44	0.795	0.38
LP _C	0.24	0.017	14.118	0.000
LY	1.13	0.523	2.161	0.042

- 6.1.1 Why is it that all the price and income figures are in real terms? (1)
- 6.1.2 Write out the estimated demand function and discuss its statistical fit. (2)
- 6.1.3 Which regression coefficients are statistically significant at the 90 percent level of significance or better? Interpret the results. (2)
- 6.1.4 What are the own-price, cross-price and income elasticities of demand for pork? Do the estimated elasticity coefficients satisfy the Homogeneity Condition? (4)

6.2 Suppose the import parity price (IPP) for wheat for RSA is R15,000 per ton. The export parity price (XPP) is R11,000 per ton. Given this information, answer the following questions:

6.2.1 How would you interpret the values of the IPP and XPP? (1)

6.2.2 In what range would you expect the domestic price of wheat to be? Why? (2)

6.2.3 What does the difference between IPP and XPP designate? (2)

6.2.4 What are the uses of the IPP and XPP estimates? (3)

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