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

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

DURATION: **3 HOURS**   TOTAL MARKS: **100**

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External Examiner: Dr SRD Ferrer

NOTE: THIS PAPER CONSISTS OF 6 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 illustrate your answers where appropriate).

1.1   Stage II of the classical production function begins where the physical efficiency of the variable input is at its minimum.   (2)

1.2   If a production function is linear (e.g., $Y = X_1 + 5X_2$) then there is no substitution between inputs.   (2)

1.3   If there are two inputs in a production process that substitute at a constant rate, then only one of the inputs should be used.   (2)

1.4   The value of the marginal product (VMP) curve for a variable input is always the farm's derived demand curve for that input.   (2)

1.5   Compared to the optimal level of production when capital is not limiting, an input is under-utilised when its value marginal product (VMP) is lower than its price.   (2)

1.6   Minimum unit cost of a product will always show maximum profit.   (2)

1.7   In the long-run there is a single optimal size for all sheep farms in the Karoo.   (2)

1.8   Small farms are subject to less expansion pressure when they are provided with an efficient extension and marketing service. (2)

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QUESTION 2

The following production function has been estimated for a dry bean enterprise on Mr. Van Rooyen farm:

$$Y = 0.4L^{0.1} P^{0.3}$$

where, Y = Dry bean yield (tons per hectare), L = Labour (hours per hectare), and P = pesticide (litres per hectare)

2.1   What is the elasticity of production for labour and pesticides, and the estimated return to scale? How is this estimates interpreted? (3)

2.2   Derive expressions for the marginal physical products (MPPs) of labour and pesticides. (2)

2.3   Given that labour costs R6 per hour and pesticide costs R144 per litre, what is the least-cost combination of labour and pesticide needed to produce 1.92 tons of dry beans per hectare? (5)

2.4   Derive an expression for the value of the marginal product (VMP) of labour and pesticide, given that the price of dry beans is R5 000 per kg? (3)

2.5   How much labour and pesticides should the farmer apply to maximize gross margin per hectare (3)

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QUESTION 3

A farmer is considering two enterprises this season, Sweet potato and Irish potato. The farmer has 5 hectares of land, 4 800 hours of permanent labour, and 2 400kg of fertilizer. Each hectare of Sweet potato requires 1200 hours of labour and 300kg of fertiliser, while each hectare of Irish potato requires 600 hours of labour and 600kg of fertiliser. The expected gross margins for Sweet potato and Irish potato are R5 000/ha and R7 500/ha respectively.

3.1   Use a graph to find the enterprise mix which maximizes farm gross margin. What is the maximum farm gross margin? (6)

3.2   Given the following additional information about maize and sorghum real gross margins observed over the past six years, express the problem of minimizing risk as a MOTAD linear programming model in matrix format:

Year	Sweet potato (R/ha)	Irish potato (R/ha)
2007	7000	6000
2008	3000	9000
2009	4500	8500
2010	5000	8000
2011	5500	6000
2012	6500	7000

(9)

3.3   Briefly explain how a farmer can use the concept of E-V boundary to improve his/her risk management.   (3)

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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 possible):

4.1   When a country imposing tariff is a 'large country', part of the tax is paid by the consumers of the importing country and part of it is absorbed by the producers of the exporting country. (2)

4.2   The introduction of an import tariff or import quota for maize often involves a deadweight loss in the importing country. (2)

4.3   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. (2)

4.4   A price index gives the actual level of price. (2)

4.5   An index that uses current period weights overstates price increases and understates price decreases. (3)

4.6   According to the symmetry condition, cross price elasticity of demand for beef with respect to pork equals the cross price elasticity of demand for pork with respect to beef.

(2)

4.7   If wheat and maize compete for agricultural inputs, an increase in the price of wheat relative to the price of maize affects maize supply. (2)

4.8   Poultry farmers in South Africa have to be concerned about export subsidies paid to beef farmers in the US. (3)

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QUESTION 5

Answer the following questions concisely and completely.

5.1   Explain the following concepts / principles in your own words. Relate your explanations to agricultural price analysis

      5.1.1 Asset fixity   (3)

      5.1.2 Export parity price   (3)

      5.1.3 Market concentration   (2)

5.2   Briefly indicate how each of the following events would be expected to affect the SA demand for and / or supply of wine and explain your reasoning.

      5.2.1 A 10% increase in the costs of labour used on the wine farm.   (2)

      5.2.2 A report indicating that alcohol consumption reduces life expectancy.   (3)

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QUESTION 6

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

6.1   Suppose that the market for an agricultural product can be represented by the following equations:

Demand: $QD = 100 - 10*P$ Supply: $QS = -20 + 5*P$

where P is the price (in Rands) per unit and Q represents quantity in units consumed per year. Given these demand and supply functions,

      6.1.1   Calculate the consumer surplus and producer surplus at the equilibrium   (2)

      6.1.2   If government decides to set the market price for this product at R5/unit, how does this affect consumers and producers?   (2)

      6.1.3   If producer and consumer surplus are taken as welfare measures, what is the impact of the   price policy (b) on social welfare?   (2)

      6.1.4   Do you support the price policy stipulated in '6.1.2'? Justify on economic grounds.   (2)

6.2 Suppose that the RSA, a "small country", is net importer of rice. The Rand equivalent world price of rice is R8,000/ton (ignore shipping and insurance costs), domestic rice production is 500,000 tons/annum, while domestic consumption is 900,000 tons/annum. The estimated own-price elasticity of demand and own-price elasticity of supply for rice in the RSA are -0.60 and 0.80, respectively. Suppose that the RSA government decides to introduce an *ad valorem* tariff on rice imports which is 25% of the value of an imported ton of rice.

> 6.2.1 Estimate the domestic rice production and consumption levels per annum after the *ad valorem* tariff. (3)

> 6.2.2 Estimate the quantity of RSA rice imports (thousands of tons per annum) and the total expenditure on rice imports after the *ad valorem* tariff. (3)

> 6.2.3 Estimate the RSA government revenue per annum from rice imports after the *ad valorem* tariff. (2)

> 6.2.4 Estimate the RSA producers' total rice revenue after the *ad valorem* tariff. (2)

> 6.2.5 Estimate the impact of the tariff on world price of rice. (1)
>
> **[19]**
>
> **[50]**