2nd SEM.2017

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME: BSC. IN AGRICULTURAL ECONOMICS AND
AGRIBUSINESS MANAGEMENT YEAR   III

COURSE CODE: AEM 306

TITLE OF PAPER: QUANTITATIVE METHODS FOR
AGRIBUSINESS DECISIONS

TIME ALLOWED: 2: 00 HOURS

INSTRUCTION: 1.ANSWER ALL QUESTIONS
2. EACH QUESTION CARRIES 25 MARKS

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THE CHIEF INVIGILATOR

Question 1   (25 points)

1.1 Given the input-output matrix

$$A = \begin{bmatrix} 0.2 & 0.1 \\ 0.3 & 0.6 \end{bmatrix}$$ and demand vector $D = \begin{bmatrix} 400 \\ 100 \end{bmatrix}$

Find the production vector that will enable the economy to meet the demands? **(12 points)**

1.2 You are given the following total cost function

$$TC = \frac{1}{5} Q^3 - \frac{1}{2} Q^2 + 2Q + 18$$

Find a) the fixed costs (FC)

  b) The variable costs(VC)

  c) Average variable costs (AVC)

  d) Average fixed costs (AFC)

  e) Show that $ATC = AVC + AFC$

(13 points)

Question 2.   (25 Points)

2 .1 A multiproduct firm is faced with the following cost function and a production constraint. The production constrains is stipulated in terms of production quota.

Cost function : $C = 3Q_1 + 2Q_2 - Q_1Q_2 + 8$

Production quota: $Q_1 + Q_2 = 20$

a) Set up a constrained cost minimization problem from the information given.

b) Construct the corresponding Lagrangian function.

c) Determine the critical values of Q_1 and Q_2 .

d) Confirm that the critical values present a minimum

(13 **points**)

2.2 Given $Q = 20 - 3p + 0.04y$, where Q is quantity demanded, p is price, and y is income, and given $p = 30$ and $y = 500$

  Find the a) price elasticity of demand.

       b) income elasticity of demand

(12 **points**)

Question 3. (25 Points)

3.1 Find MPK and MPL for the following production function
$Q = 16K^{1/2}L^{1/4}$ and determine whether or not the function is characterized with diminishing returns to factor inputs.
(12 points)

3.2 Calculate the definite integrals.

a) $\int_0^1 3^x dx$

b) $\int_1^2 x(x^2 + 3)dx$
(13 points)

Question 4. (25 Points)
4.1 Consider the following demand function for good a
$Q_a = 200 - 4p_a - 2p_r + 0.2y$
Where Q_a = Quantity of good a in demand.
$\quad$ p_a = price of good a.
$\quad$ P_r = price of some related goods r.
$\quad$ Y = consumer income.
Given $p_a = =20$, $p_r = 24$, y = 2000,
Find the following elasticity and interpret your results.
a) Own price elasticity of demand
b) Cross-price elasticity of demand
c) Income elasticity of demand
(12 points)
4.2 A firm manufactures two products A(table) and B(chair), the market for each being virtually unlimited. Each product is processed on each of the machines I, II and III. The processing times in hours per item of A or B on each machine are given in the table.

	A (table)	B(chair)	Resource's
I	0.5	0.4	40
II	0.25	0.3	36
III	0.7	0.9	64

The available production time of the machines I ,II and III is 40 hours,36 hours and 64 hours respectively each week. The profit per item of A and B is E5 and E3 respectively.
The firm wishes to determine the weekly production of items of A and B which will maximize its profit. Formulate this problem as a linear programming problem only.

(13 points)

END OF PAPER