

**UNIVERSITY OF SWAZILAND**

**SUPPLEMENTARY EXAMINATION 2005/2006**

**Title of Paper: Quantitative Methods**

**Course Code: ECON 205**

**Time Allowed: Three(3) Hours**

**INSTRUCTIONS:**

1. Answer Four (4) Questions. Two from Section A and Two from Section B
2. All Questions Carry Equal Marks of 25 Each
3. The relevant discount tables are supplied

**DO NOT OPEN THE QUESTION PAPER UNTIL THE INVIGILATOR  
GRANTS YOU PERMISSION**

### Question 1

- a) Determine the level of output for industries X,Y,Z, given the matrix of technical coefficients, A, and final demand vector, D, below. [15 marks]

$$A = \begin{matrix} & 0.2 & 0.3 & 0.2 \\ 0.4 & & & \\ 0.3 & 0.5 & 0.2 & \end{matrix} \quad D = \begin{matrix} 150 \\ 200 \\ 210 \end{matrix}$$

- b) Interpret the first column of the technical coefficients matrix A. [5 marks]
- c) Determine and interpret the output multipliers of all industries. [5 marks]

### Question 2

- a) If the marginal cost function of a firm is

$$MC = 25 + 30Q - 9Q^2 \text{ and its fixed cost is E55}$$

Find the firm's

- i) total cost function [3 marks]  
ii) average cost function [2 marks]  
iii) variable cost function [2 marks]

- b) From the following total cost function

$$TC = Q^3 + 5Q^2 + 60Q$$

- i) find the average cost function and the value of Q at which AC is minimized. [3 marks]
- ii) find the marginal cost function [2 marks]
- iii) find the value of Q at which AC and MC are equal [3 marks]

- c) Given the demand function  $P_d = 25 - Q^2$  and Supply function  $P_s = 2Q + 1$ . Assuming pure competition, find

- i) the consumer's surplus [5 marks]
- ii) the producer's surplus [3 marks]
- iii) present the results graphically [2 marks]

### Question 3

a) Explain what is meant by break even analysis. [5 marks]

b) Given the following demand and cost functions for " Last Chance Investments"

$$P = 12 - Q$$

$$C = 10 + 2Q + Q^2$$

(i) determine the break even level of output and price [5 marks]  
 (ii) derive the net revenue function [3 marks]

(iii) determine the level of output at which net revenue is maximum and hence find the value of maximum net revenue. [5 marks]

c) What are the advantages and limitations of the Break even technique? [7 marks]

### Question 4

Define and explain the following concepts

a) Static vs. comparative equilibrium analysis

b) structural vs. reduced form model

c) Behavioural vs. definitional equation

d) deterministic vs. stochastic model

e) Endogenous vs. exogenous variables [5 marks each]

## SECTION B

### Question 5

- a) What are the three common price indexes? [6 marks]
- b) Explain why the Laspeyres price index is an overstatement and the Paasche index usually is an understatement. [4 marks]
- c) What are the objectives of the following?
- (i) Consumer Price Index [3 marks]
  - (ii) Producer Price Index [3 marks]
  - (iii) Price Deflator for GNP [3 marks]
- d) Which of these index numbers is preferred as a measure of general inflation? Why? [6 marks]

### Question 6

If A, B, C are three events, find expressions for the events that out of A, B, C

- a) only A occurs
- b) both A and B, but not C occur
- c) all three occur
- d) at least one occurs
- e) one and no more occurs [5 marks each]

### Question 7

The following table shows the weekly labour costs paid (X) and weekly revenues received from bicycle repairs (Y) by a bicycle shop for a quarter of a year.

Labour costs (E)	REVENUES (E)
7.1	3.9
2.2	1.7
7.2	3.7
3.1	1.5
3.3	2.2
3.5	1.4
7.7	4.9
4.1	2.5
6.8	4.5
4.7	3.4
5.3	2.3
5.5	3.6
6.1	3.2

- a) Find the least-squares line which will enable us to predict repair revenues from labour costs of the bicycle shop. [15 marks]
- b) interpret the results. [3 marks]
- c) find the coefficient of correlation and test its significance at 5% level. [4 marks]
- d) calculate the coefficient of determination. [3 marks]

### Question 8

Briefly explain the following

- a) Coefficient of correlation [5 marks]
- b) Coefficient of determination [5 marks]

c] Multicollinearity

[5 marks]

d] Autocorrelation

[5 marks]

e] Significance of the error term.

[5 marks]