MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

SECOND YEAR FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF BUSINESS ADMINISTRATION WITH INFORMATION TECHNOLOGY

HOMA-BAY CAMPUS

ABA 205: MANAGEMENT MATHEMATICS II

Date: 24th June, 2017 Time: 9.00 - 12.00 noon

INSTRUCTIONS:

- Answer question ONE and any other THREE questions.
- Marks allocated are shown at the end of each question.

QUESTION ONE (25 MARKS)

a. Define the following terms:
   i. Column vector. (1 mark)
   ii. Optimality condition. (1 mark)
   iii. Domain of a function. (1 mark)

b. A company produces two types of pens, A and B. Profits on pen A and B are Kshs. 5 and Kshs .3 respectively. Raw materials required for each pen A is twice of that required for pen B. The supply of raw material is sufficient only for 1000 pens of B per day.

Required:

Determine graphically the product mix so that the company can make maximum profit. (8 marks)

c. An airline operating a flight from Kisumu to Nairobi uses a 200 seater aircraft. Past experience shows that all sets on the flight will be sold if the airline charges a discounted fare of Kshs. 3000 per seat. However, for every increase of Kshs. 50 on the fare, two seats will remain unsold.

Required:

The fare per week that will maximize the revenue per trip. (6 marks)

d. The daily cost of operating a hotel kitchen is the direct function of guests living in (L) and guests coming to dine (D) at the hotel plus a fixed cost F given as:

$$C = F + aL + bD.$$

Given the data of the last three days as below:

Day	Cost (Kshs)	Number of guests living (L)	Number of guests dining (D)
1	13,000	30	20
2	16,000	35	40
3	16,400	42	30

Required:

Find the values of F, a and b using Cramer's rule (8 marks)

QUESTION TWO (15 MARKS)

A company produces three products every day. The total production on a certain day is 90kg. It is found that the production of the first product exceeds the production of the second by 20 kg while the total production of the first and second products is twice the production of the third.

Required:

Determine the level of output of each product using matrix algebra. (15 marks)

QUESTION THREE (15 MARKS)

A farmer has a very large holding of land on which he can grow corn, wheat or soyabeans. Each acre of corn requires Kshs. 1000 for preparation and 7 man days of work, and yields a profit of Kshs. 3000. An acre of wheat costs Kshs. 1200 to prepare, requires 8 man days of work and yields a profit of Kshs. 4000. An acre of soyabeans costs Kshs. 700 to prepare, requires 8 man days of work and yields a profit of Kshs. 2000. As per the government policy, he must sow wheat on atleast 80 acres of land. The farmer has Kshs. 108,000 for preparation and can count on 800 man days of work.

Required:

i. Formulate the linear programming problem. (5 marks)

ii. Using simplex algorithm method, how many acres should the farmer allot to each crop to maximize the profits? (10 marks)

QUESTION FOUR (15 MARKS)

The demand and total cost function for a firm are $p = 20 - 0.04x$ (where p denotes the price and x the quantity) and $TC = 4x + 200$. The government imposes a tax of Kshs. 1 per unit.

Required:

i. Determine the quantity and price that will yield the maximum profit, with and without the tax. (8 marks)

ii. What should be the rate of tax in order to maximize the tax revenue?
(7 marks)

QUESTION FIVE (15 MARKS)

a. Given that:

$$A = \begin{pmatrix} 2 & 3 & 1 \\ 7 & 9 & 5 \\ 8 & 12 & 6 \end{pmatrix}$$

Required:

Determine A^{-1} (7 marks)

b. Suppose the price p and quantity x of a product are related by the function:

$$x=16-4p-p^2$$

Required:

i. Elasticity of demand. (4 marks)
ii. Marginal revenue. (4 marks)