KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: FNCE 120/ECON 121

TITLE: MANAGEMENT MATHEMATICS/MATHEMATICS

FOR ECONOMICS I

STREAM: Y1S2

DAY: SATURDAY

TIME: 9.00 – 11.00 A.M.

DATE: 07/08/2010

INSTRUCTIONS:

1. Answer question **ONE** and any other **TWO** questions
2. Begin each question on a separate page
3. Show your workings clearly

PLEASE TURNOVER

QUESTION ONE (30 MARKS)

a) Rivertex manufactures garments which it sells for Ksh 550 per unit. Each unit cost the firm Ksh 230 in variable expenses, and fixed costs on an annual basis are Ksh 4,000,000. If x equals the number of units produced and sold during the year:

    i)   Formulate the linear total cost function   **(2 marks)**

    ii)   Formulate the linear total revenue function   **(2 marks)**

    iii)   Formulate the linear profit function   **(2 marks)**

b) In a survey of 60 people, it was found that 25 read Daily Nation, 26 read Kenya Times and 26 read the Standard. Also 9 read both Daily Nation and the Standard, 11 read both Daily Nation and Kenya Times, 8 read both Kenya Times and the Standard and 8 read no magazine at all.

    i)   Find the number of people who read all three magazines   **(2 marks)**

    ii)   Find the number of people who read exactly one magazine   **(2 marks)**

    iii)   Find the number of people who read two magazines   **(2 marks)**

    iv)   Find the number of people who do not read any of the magazines   **(2 marks)**

c) Expand $(1+2y)^{20}$ upto the term y^5 and hence evaluate $(0.96)^{20}$ and $(1.04)^{20}$ **(6 marks)**

d) Describe graphically Relative maximum, Relative minimum, Absolute minimum and Absolute maximum   **(4 marks)**

e) Explain the function of lagrange multiplier in optimization process   **(2 marks)**

f) Integrate the function using substitution method

$$\int (3x + 4)^{12}$$
                                                                        (4 marks)

QUESTION TWO (20 MARKS)

a) The demand for commercial forestland Timber has been increasing rapidly over the past three to four decades. The function describing the rate of demand for timber is

$$d(t) = 20 + 0.003t^2$$

Where d (t) is stated in billions of cubic feet per year and t equals time in years (t = 0 corresponds to January 1 1990)

   i)   Determine the rate of demand at the beginning of 1995   **(5 marks)**

   ii)   Determine the total demand for timber during the period 1990 through 2009

(5 marks)

b) For the following function determine the location of all critical points and determine their nature

$$f(x) = 40e^{-0.05x} + 6x - 10$$ **(10 marks)**

QUESTION THREE (20 MARKS)

a) A retailer has determine that the annual cost C of purchasing, owning and maintaining one of its products behaves according to the function

$$C = f(q) = \frac{20,000}{q} + 0.5q + 80,000$$

Where q is the size (in units) of each order purchased from suppliers

   i)   What order quantity q results in minimum annual cost   **(6 marks)**

   ii)   What is the minimum annual cost   **(4 marks)**

b) The total cost and total revenue functions for a product are

$$C(q) = 5,000,000 + 250q + 0.002q^2$$

$$R(q) = 1,250q - 0.005q^2$$

   i)   Using marginal approach, determine the profit- maximization level output

(7 marks)

   ii)   What is the maximum profit   **(3 marks)**

QUESTION FOUR (20 MARKS)

a) Given the following constraint optimization problem

Maximize $f(x_1, x_2) = 25 - x_1^2 - x_2^2$ profit function

Subject to $2x_1 + x_2 = 4$ raw materials   **(20 marks)**

Find the maximum profit that will satisfy the raw materials constraint and determine its nature.

QUESTION FIVE (20 MARKS)

a) A Manufacturer estimates that the annual sales (in units) are a function of the expenditures made for Maize and Beans A dvertising. The function specifying the relationship is

$$Z = 80,000x + 120,000y - 10x^2 - 20y^2 - 20xy$$

Where Z equals the number of units sold each year, x equals the amount spent for maize advertizing and y equals amount spent for Beans advertizing (both x and y in 1000's)

i)   Determine how much should be spent for maize and beans advertizing in order to maximize the number of units sold   **(10 marks)**

ii)   What is the maximum number of units expected to equal   **(4marks)**

b) Explain the importance of rate of change in Business and economics   **(6 marks)**