KABARAK UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: FNCE 120

COURSE TITLE: MANAGEMENT MATHEMATICS I

STREAM: YIS2

DAY: FRIDAY

TIME: 9.00 – 11.00 A.M.

DATE: 27/03/2009

INSTRUCTIONS:

i.   Answer Question **One** and Any **Other Two** questions.
ii. All Workings Leading to Answers Must Be Clearly Shown

PLEASE TURN OVER

QUESTION ONE: (Compulsory) (30 Marks)

a) Highlight the five assumptions of break-even analysis. (5Marks)

b) Solve the following simultaneous equations: $3x + 4y = 12$; and $4x - 7y = 16$. (3 Marks)

c) Determine the equation of the straight line that has a slope of -5 and a Y intercept of (0,15).

(2 Marks)

d) In manufacturing a firm incurs costs of two types. Fixed annual cost of Kshs 250,000 are incurred regardless of the number of units produced. In addition, each product produced costs the firm Kshs 6. If C is the total cost in Shs and X equals the number of units produced during a year:

    i.   Determine the function f(x) (2 Mks)

    ii.   What is f(200,000) (1 Mks)

e) A company is able to sell two products X and Y which have demand functions

$$P(x) = 52 - 2x$$
$$P(y) = 20 - 3y$$

Its total cost function is $TC = 10 + 3x^2 + 2y^2 + 2xy$.

Required: Determine the profit maximizing levels of output and prices for X and Y (8 Mks)

f) In a certain group of 75 students, 16 students are taking Psychology, Geology and English. 24 students are taking Psychology and Geology, 30 students are taking Psychology and English, 22 students are taking Geology and English. However 7 students are only taking Psychology, 10 are taking only Geology and 5 are taking only English.

    i. How many of the students are taking Psychology? (2Mks)

    ii. How many of the students are taking Psychology and English but not Geology? (3Mks)

    iii. How many students in this group are not taking any of the three subjects?

         (2Mks)

g) Find the derivative of the indicated function using the first principles method.

    $Y = 3x^2 + 2x + 1$ (2Mks)

QUESTION TWO (20 Marks)

a) Determine $\int_1^4 (8x^3 + 6x^2 - 10x + 5)dx$ (3Mks)

b) A sales lady's monthly earnings comprise of a fixed and a variable component which is dependent on the number of handkerchiefs sold. She finds that when she sells 300 pieces on a given month, she earns kshs, 60, 000, whereas when she double her sales her salary increases by Kshs. 10, 000. Determine the monthly fixed earnings; and what will be her earnings if she sells 200 pieces. (5 Marks)

c) Distinguish between Differential Calculus and Integral Calculus. (2Mks)

d) A manufacturer employs locals and foreigners. Investigation by the company's accountant have shown that costs can be expressed as a function of local workers (x) and foreigners (y) as follows

F (x) = $4x^2 + 3xy + 6y^2$. Furthermore, the total number of workers should be only 56. Find the number of workers of each category to be employed in order to minimize cost.

(8Mks)

e) Obtain the derivative of Y $=10x^7 - 4x^5 + 8x^3 - 7x^3 + 9$ (2Mks)

QUESTION THREE (20 Marks)

a) The demand function Q (d) = f (p) for a product is quadratic. Three points which lie on the function are (p,q) = (10 2700), (20, 1200), (30, 300).

    i. Determine the equation for the demand function (4 Mks)

    ii. What quantity will be demanded at Kshs 5? (2 Mks)

b) A hospital blood bank conducts an annual blood drive to replenish its inventory of blood. The hospital estimates that blood will be donated at a rate d(t) litres per day where d(t) = $500\ e^{-0.04}$ where t is the length of blood drive in days. If the goal for the blood drive is 1000 litres, when will the hospital reach its goal? (6 Mks)

c) Given that

μ={x | x is a positive integer less that 15}

A = {1, 3, 5,7}

B= {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
C= {2, 6, 8}

Find

i.	AUB	v.	A n B
ii.	AUC	vi.	A' n B'
iii.	BUC	vii.	B' n C
iv.	A n C	viii.	B' n A

(8Mks)

QUESTION FOUR (20 Marks)

a) The resale value (V) of a piece of industrial equipment has been found to be according to the function V= 250,000 e$^{-0.06t}$ where t is the years since original purchase.

   i. What is the original value of the piece of equipment? (1 Mk)

   ii. What is the expected sale after 10 yrs? (2Mks)

b) In a bid to rehabilitate street children in Nakuru town, a study of drug taking behaviour from a sample of 112 children had the following statistics. 50 children used drug A, 66 children used drug B, 38 children used drug C, 32 children used drug A and B, 22 used drug B and C, 20 used drug A and C. Given that 24 children did not use any of the drugs at all, find the number of children who used:

   i. All the three drugs

   ii. Drug C alone

   iii. At most one of the drugs

   iv. At least two of the drugs (8 Mks)

c) A national manufacturer estimates that the number of units it sells each year is a function of its expenditure on radio and TV advertising. The function is Z = 50,000x + 40,000y – 10x^2 -20y^2 - 10xy. Find the values of x and y to be spent on advertising in order to maximize sells. (6Mks)

d) Discuss the three requirements of a set. (3mks)