KABARAK UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE*:* **FNCE 120:**

COURSE TITLE: ***MANAGEMENT MATHEMATICS I***

STREAM: **Y1S2**

DAY: **THURSDAY**

TIME: **11.00-1.00 P.M.**

DATE: **18/12/2008**

INSTRUCTIONS:

*i. Answer Question **One** and any **Other Two***
ii. All workings leading to answers must be clearly shown

PLEASE TURN OVER

QUESTION ONE: (40 Marks)

a) From a survey of 100 customers, a marketing research company found that out of that 75 customers purchased stereos, 45 purchased cars and 35 purchased cars and stereos.

i. How many of the customers purchased either a car or stereo?

ii. How many students did not purchase a car or stereo? **(4Mks)**

b) If the population in Kenya was around 33 Million people in 2007 and if the population continues to grow at 2%, what will be the population in 2015? **(4Mks)**

c) The revenue from the sale of x units at a home supply outlet is given by R + 0.21x. The profit from the sale of x units is given by P = 0.84x – 1.5

i. Find the cost equation **(2Mks)**

ii. What is the cost of producing 7 units **(1Mk)**

iii. What is the break-even point? **(2Mks)**

d) Solve

i. $x^2 - 3x = 5$

ii. $3x + 4 \leq 12$ **(4Mks)**

e) Suppose that the Price and Demand for an item are related by $P = 150 – 6Q^2$. The Supply and Price are related by $P = 10Q^2 + 2Q$. Find the equilibrium demand and price.**(3Mks)**

f) The weekly demand function for a particular product is

$$Q = f(p) = 30{,}000 - 25p.$$

i. Determine the quadratic Total Revenue function where Revenue is a function of p. **(2Mks)**

ii. At what price will Total profit be maximized? **(3Mks)**

g) Give that U ={x ׀x is a positive integer less than 20}, A = {5, 10, 15}, B = {2, 4, 8, 10}, C = {1, 5, 9, 15, 17}

Find

i. A n B **(1Mk)**

ii. A'n B' **(2Mks)**

iii. (A n B n C)' **(2Mks)**

iv. A' u C' **(2Mks)**

h) 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. **(8 Marks)**

QUESTION TWO (20 Marks)

a) Given the exponent decline in value as $\mathbf{V_t = V_0 e^{-rt}}$. A company purchased equipment in January 2000 at Kshs. 150, 000 and expected to depreciate exponentially at 10% per year.

i. What will be the expected value of the equipment at the end of 2008 and 2012? **(4 Marks)**

ii. The company has a policy to dispose their equipment after 10 years. What will be the disposal value of this equipment? **(4 Marks)**

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

c) Determine the linear function which passes through the following points; (2, 5) and (5, 17). **(2 Marks)**

d) The Total Cost and Total Revenue functions for a product are

$C(x) = 500 + 100q + 0.5\,q^2$

$R(x) = 500q$

a) Determine the profit maximizing level output

b) What is the maximum profit? **(7Mks)**

QUESTION THREE (20 Marks)

a) Ethiopia has a population of around 52 million people and it is estimated that the population will double in 2 years. If the population growth continues at the same rate, what will be the population in

i. 10 yrs

ii. 30 yrs **(4Mks)**

b) The demand for the product of a firm varies with price that the firm charges for the product. The firm estimates that annual total Revenue (R) is a function of the price p

$R = f(p) = -50\,p^2 + 500p.$

i. Determine the price which should be charged in order to maximize Total Revenue. **(3Mks)**

ii. What is the maximum value of total revenue? **(2Mks)**

c) Highlight the five assumptions of break-Even Analysis. **(5Marks)**.

d) A factory manufactures two types of heavy duty machines in quantities x and y. the joint cost function is given by: $C = x^2 + 2y^2 - xy$. How many machines of each type should be produced if they have to be a total of 8 and what is the associated minimum cost? **(6 Marks)**

QUESTION FOUR (20 Marks)

a) An epidemic is spreading through a large Western town. Health officials estimate that the number of persons who will be afflicted by the disease is a function of time since the disease was first detected. Specifically the function is $n= f(t) =300t^3 - 20t^2$ where n is the number of people infected and $0 \leq t \leq 60$ measured in days.

i. How many people are expected to have caught the disease after 10 days and 30 days **(4Mks)**

ii. What is the average rate the disease is expected to spread between t= 10 and t= 30? **(3Mks)**

b) 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)**

c) A company sells a product for Kshs. 150 per unit. Raw materials costs are Kshs 40 per unit, labour costs are Kshs. 55 per unit; Shipping costs are Kshs. 15 per unit and annual fixed costs are Kshs. 200,000.

a. Determine the profit function **(3Mks)**

b. How many units must be sold in order to earn an annual profit of Kshs. 750,000? **(4Mks)**