KISII UNIVERSITY

UNIVERSITY EXAMINATIONS

MAIN/TOWN CAMPUS

FIRST YEAR EXAMINATION FOR THE AWARD OF THE DEGREE OF BACHELOR OF COMMERCE/BUSINESS MANAGEMENT/PURCHAASING AND SUPPLIES MANAGEMENT/ENTERPRENEURSHIP AND SMALL BUSINESS

FIRST SEMESTER 2014/2015

(SEP-DEC, 2014)

BCOM 170: BUSINESS MATHEMATICS I

STREAM: Y1S1 **TIME: 2 HOURS**

DAY: WEDNESDAY 8:00-10:00AM **DATE: 17/12/2014**

INSTRUCTIONS

1. ***Do not write anything on this question paper.***
2. ***Answer question ONE and any other TWO questions.***

QUESTION ONE - COMPULSORY (30 marks)

a) There is a committee to be selected consisting of 5 people from a group of 5 men and 6 women. If the selection is randomly done, find the possibility of having the following possibilities (combinations):

i) At least one man and at least one woman must be in the committee. **(3 marks)**

ii) One particular man and one particular woman must not be in the committee (one man four women). **(4 marks)**

b) Calculate the point elasticity of demand from the given demand function

$Q = 100 - 2P + \frac{100}{P}$, at the point where P = 10. **(4 marks)**

c) Find the expansion of $(2 + x)^6$ using the binomial theorem by combination **(3 marks)**

d) Evaluate the following integral: $\int_2^5 (x + 3)(x - 1)dx$ **(3 marks)**

e) Solve the following by substitution method **(3 marks)**

$2x + y = 8$

$3x - 2y = -2$

f) Determine the critical values and find out whether these critical values are maxima or minima. Hence determine the extreme values of the function

$h(x) = \frac{1}{3}x^3 + x^2 - 35x + 10$ **(4 marks)**

g) Simplify the following without using the mathematical tables:

$$2Log_6 3 + Log_6 12 + Log_6 8 - Log_6 24$$ **(2 marks)**

h) Solve the equation $\frac{3}{2x+1} + \frac{4}{5x-1} = 2$ **(2 marks)**

i) Given B = (5, 8, 11, 20, 25) and C = (1, 3, 5, 7, 9, 11, 13), find

i) $B \cap C$

ii) $n(B \cup C)$ **(2 marks)**

QUESTION TWO (20 marks)

(a) Given a demand function is a rectangular hyperbola of the form $Q = {}^{1}/_{P}$, show that the point elasticity will be unitary throughout the demand curve. **(12 marks)**

(b) A teacher has 150 students in commerce. 70 were registered in accounting, 50 finance, 90 economics, 30 in accounting and finance, 20 finance and economics, 30 in accounting and economics, 10 in accounting, finance and economics.

Required:

Find the number of students who were registered in:

i) Two courses only

ii) One course only

iii) None of the three courses

iv) At least two courses **(8 marks)**

QUESTION THREE (20 marks)

(a) Given a demand function of the form $0.1Q - 10 + 0.2P^2 = 0$, calculate the price elasticity of demand when P = 10. **(5 marks)**

(b) A farmer of a large farm of poultry announced that egg production per month follows the equation;

$$w = \frac{3m^3 - m^2}{m^2 + 10}$$

Where w – Total no of eggs produced per month

m – Amount in kilograms of layers mash feed.

Required

Determine the rate of change of 'w' with respect to 'm' (i.e. the rate at which the number of eggs per month increase or decrease depending on the rate at which the kilos of layers marsh are increased).

(5 marks)

(c) An electronics firm carries out a small-scale test launch of a new low-priced pocket calculator. It estimates from this test that if it went into full-scale production it would sell between 1,000 and 2,500 calculators per month, and that its monthly revenue in thousands of shillings over this range of sales could be represented by the equation:

$$R = -x^2 + 5x,$$

Where x is the monthly output in thousands of calculators (it is assumed that it sells its entire output).

From experience of calculator production, the firm estimates that its marginal costs in thousands of shillings could be represented by the equation:

$$MC = x^2 - x + 2,$$

and that its fixed costs will be Sh. 500 per month.

Required:

(i) Determine the average cost and revenue equations for this firm. **(4 marks)**

(ii) Determine the profit-maximizing output, the price that should be charged to maximize profit, and how much each calculator will then cost to make. **(6 marks)**

QUESTION FOUR (20 marks)

a) Job and Okemwa, having graduated from Kisii University with the bachelor of Commerce degree have recently started to give business advice to their clients. Acting as consultants, they have estimated the demand curve of a client's firm to be;

$$AR = 200 - Q$$

Where AR is average revenue in millions of shillings and Q is the output in units.

Investigations of the clients firm's cost profile shows that marginal cost (MC) is given by:

$$MC = Q^2 - 28Q + 211 \text{ (in millions of shillings)}$$

Further investigations have shown that the firm's cost when not producing output is Sh.10 million.

Required:

i) The equation of total cost. **(2 marks)**
ii) The equation of total revenue **(2 marks)**
iii) An expression for profit **(2 marks)**
iv) The level of output that maximizes profit. **(2 marks)**
v) The equation of marginal revenue. **(2 marks)**

(b) The commodity and money market for an economy are defined by the following equations:

Commodity market

$Y = C + I$

$C = 200 + \frac{2}{5}Y$

$I = 1900 - 12r$

Money market

$M_{DT} = \frac{1}{2}Y$

$M_{DS} = 100 - 10r$

$MS = 1500$

Required:

i)	Determine the IS and the LM functions for the economy.	**(5 marks)**
ii)	What is the equilibrium income and rate of interest for the economy?	**(5 marks)**

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