# The Co-operative University College of Kenya

*(A Constituent College of Jomo Kenyatta University of Agriculture & Technology)*

**END OF SEMESTER EXAMINATIONS APRIL - 2015**

**UNIT CODE: HCOB 2201**

**UNIT TITLE: MANAGEMENT MATHEMATICS II**

**DATE: TIME:**

**INSTRUCTIONS:**
Answer question **ONE (compulsory)** and any other **TWO** questions

**QUESTION ONE**

a) A market survey is made on two brands of breakfast A and B. every time, a customer purchases, he may buy the same brand or switch to another brand. The transition matrix is given below

| | To | |
|---|---|---|
| From | A | B |
| A | 0.8 | 0.2 |
| B | 0.6 | 0.4 |

At present, it is estimated that 60 percent of the people buy brand A and 40 percent buy brand B. determine the market shares of brand A and B in the steady state (7 Marks)

b) Some two commodities have the following demand and supply functions

$Qd_1 = 4 - 2p_1 + 2p_2$
$Qd_2 = 6 - 2p_1 - 2p_2$
$Qs_1 = -3 + p_1$
$Qds_2 = -2 + 2p_2$

Determine the equilibrium values of prices and quantities for the two commodities (7 Marks)

c) Consider the following total cost function

$TC = \propto Q^3 - bQ^2 + Cq + D$ a, b, c, d > 0.

Find: -

i) The fixed cost (FC) (2 Marks)
ii) The variable cost (VC) (2 Marks)
iii) The average variable costs (AVC) (2 Marks)

iv) The level of $Q$ at which the average variable costs are minimized (4 Marks)

d) Three farmers A, B and C bought the following units of Jembes and Pangas for the ploughing and planting season

| Farmers | Jembes | Pangas |
|---|---|---|
| A | 50 | 7 |
| B | 30 | 4 |
| C | 40 | 5 |

The prices of a Jembe and a Panga are Kshs 30 and Kshs 80 respectively. Using Matrix method, find how much each one of the farmers spent on the Jembes and Pangas they bought (6 Marks)

**QUESTION TWO**

a) Find the derivatives of the following functions

i. $y = (3x^2 + 1)^3$ (3 Marks)

ii. $y = \frac{x+1}{x^2+2x+1}$ (3 Marks)

iii. $y = (x^2 + 1)(x + 4)$ (3 Marks)

b) A firm's total revenue and total cost are indicated below

$TR = 40x - 8x^2, TC = 8 + 16x - x^2$

i) Find the level of output at which total profit is a maximum (6 Marks)

ii) What price will be charged for (i) above? (5 Marks)

**QUESTION THREE**

a) Integrate the following functions with respect to x

i. $y = (2x + 4)^2$ (3 Marks)

ii. $y = \frac{1}{(x-5)^3} dx$

b) Evaluate: -

c) $\int_1^2 \frac{2+6x}{(2x+3x^2)^3} dx$

d) The demand equation of a firm's product is given by $P = -5Q + 3000$. The firm's total cost equation is given by $TC = 50Q + 10000$. Determine

i. The quantity that maximizes revenue (3 Marks)

ii. The quantity and price that maximizes profits (4 Marks)

iii. The maximum profit (4 Marks)

**QUESTION FOUR**

a) Solve the following

$x_1 + 2x_2 + 3x_3 + 4x_4 = 10$

$2x_2 + x_4 = 3$

$3x_1 + 2x_2 + x_3 + x_4 = 7$

$4x_1 + x_2 + x_3 = 6$ (10 Marks)

b)