



The Co-operative University of Kenya

END OF SEMESTER EXAMINATION – DECEMBER 2016

EXAMINATION FOR THE BACHELOR OF CO-OPERATIVE BUSINESS
(BCOB YR II SEM I)

UNIT CODE: HCOB 2201

UNIT TITLE: MANAGEMENT MATHEMATICS II

DATE: 6TH DECEMBER, 2016

TIME: 9:00 AM – 11:00 AM

INSTRUCTIONS:

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

QUESTION ONE

- (a) Two commodities have the following demand and supply functions: -

$$Qd_1 = 4 - 2p_1 + 2p_2$$

$$Qd_2 = 6 + 2p_1 - 2p_2$$

$$Qs_1 = -3 + p_1$$

$$Qs_2 = -2 + 2p_2$$

Using matrices determine

- Equilibrium values of prices (5 Marks)
- Equilibrium values of quantities (5 Marks)

- (b) Integrate the following functions

i. $\int \frac{3x^2}{(x^3+5)} dx$ (4 Marks)

ii. $\int_2^5 (2 + 3x) dx$ (4 Marks)

- (c) Given the marginal cost function

$$MC = 3 - 2Q + Q^2$$

Determine:

- The corresponding total cost function (3 Marks)
- The total variable cost for an output level of $Q=5$ (3 Marks)
- The fixed cost, given that, when $Q=2$, the total cost $C=15$ (3 Marks)
- The value of Q where $MC = 0$ (3 Marks)

QUESTION TWO

- (a) Given $TR = 15Q - \frac{1}{5}Q^2$, $TC = 200 + Q$

Find the profit maximizing levels of output (5 Marks)

- (b) Find the level of Q at which the average cost (AC) functions are minimized given

$$TC = 120Q - 10Q^2 + 2Q^3 + 250$$
 (5 Marks)

- (c) Consider the following total cost function: -

$$TC = aQ^3 - bQ^2 + cQ + d \quad a, b, c, d > 0$$

Find:-

- The fixed costs (FC) (1 Mark)
- The variable costs (VC) (1 Mark)

- iii. The average variable cost (AVC) (1 Mark)
- iv. The level of Q at which the average variable costs are minimized (2 Marks)

QUESTION THREE

Two farmers sold the following amounts of goods X and Y to the buyer

Farmer	Sales	Per ton
	x	Y
A	20	40
B	30	50

The two farmers made \$ 500 profits per ton. From X and \$700 per ton from Y

- i. How much X did B sell to the buyers? (2 Marks)
- ii. How much Y did A sell to the buyers? (3 Marks)
- iii. What is the total amount of Y to the buyers by both farmers (4 Marks)
- iv. Using matrix multiplications; find the profits made by each of the farmers from both X and Y (6 Marks)

QUESTION FOUR

For each of the following functions, find the derivative of X with respect to Y

- a. $Y = 3x^4 - x^2$ (3 Marks)
- b. $Y = \frac{1}{x^4}$ (3 Marks)
- c. $Y = (5 + 13x - x^4)^4$ (3 Marks)
- d. $Y = \frac{1}{\sqrt{(x+x^3+x^4)}}$ (3 Marks)
- e. $Y = \frac{1}{(3x+1)^2}$ (3 Marks)

QUESTION FIVE

- (a) Assume that the marginal profit function for a company is $y = 100 - 2x$, where x is sales in units and the company breaks even on sales of 5 units.
 - i. What are the fixed costs of the company? (5 Marks)
 - ii. What is the increase in profit in moving from activity levels of 10 to 15 units (6 Marks)
- (b) The total revenue obtained from selling x items in a particular day is given as a function of x suppose the marginal revenue is $y = 20 - 4x$
 - Find the number of items sold that will maximize the total revenue (2 Marks)
 - Hence the total revenue (2 Marks)