



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER**

**SCHOOL OF BUSINESS AND ECONOMICS
BSC. ECONOMICS/BSC. FINANCIAL ECONOMICS/BSC.
ECONOMICS AND STATISTICS
BACHELOR OF SCIENCE IN ECONOMICS**

COURSE CODE: ECO 2206

COURSE TITLE: CALCULUS FOR ECONOMISTS II

DATE: 25TH APRIL, 2018

TIME: 8.30 - 10.30AM

INSTRUCTIONS TO CANDIDATES

- *Answer ALL questions in Section A and ANY Other THREE questions from Section B*
- *DO NOT MAKE ANY WRITING ON THIS QUESTION PAPER*

This paper consists of FOUR printed pages. Please turn over.

SECTION A (25 MARKS)

QUESTION ONE (25 MARKS)

a) Differentiate the following functions: -

i. $f(x) = 2x^{10} - 15x^7 + 3x^3 - 15$ **(2 Marks)**

ii. $y = 4x^{-16} + 2x^{-4} + 10x^{-2} + 94$ **(2 Marks)**

iii. $f(t) = (3t^3 + 1)(t^2 + 6t)$ **(3 Marks)**

iv. $f(y) = (8y^5 - 5)^6$ and evaluate $f'(1)$ **(3 Marks)**

v. $f(x) = \ln(2x^4 + 3x - 10)$ **(2 Marks)**

b) If the average cost function for a good is

$$AC = \frac{24}{Q} + 15 + 3Q$$

i. Find an expression for the total cost function. **(2 Marks)**

ii. what are the fixed costs in this case? **(1 Mark)**

iii. write down an expression for the marginal cost function. **(2 Marks)**

c) If the consumption function is

$$C = 0.005Y^2 + 0.6Y + 10$$

Calculate the marginal propensities to consume and save when $Y=20$ and give an interpretation of the results. **(5 Marks)**

d) Find the marginal cost function given the average cost function

$AC = \frac{100}{Q} + 2$ deduce that a one-unit increase in Q will always result in a two-unit increase in TC irrespective of the current level of output. **(3 Marks)**

SECTION B (45 MARKS)

QUESTION TWO (15 MARKS)

a) A firm short run production function is given by

$$Q = 6L^2 - 0.2L^3 \quad \text{where } L \text{ denotes the number of workers}$$

- i. Find the size of the work force that maximizes output. **(4 Marks)**
- ii. Find the size of the work force that maximizes the average product of labour. **(4 Marks)**

b) The demand equation for a good is $P + Q = 30$ and the total cost function is

$$TC = \frac{1}{2}Q^2 + 6Q + 7 \quad \text{Find: -}$$

- i. The level of output that maximizes total revenue. **(4 Marks)**
- ii. The level of output that maximizes profit. **(3 Marks)**

QUESTION THREE (15 MARKS)

a) Evaluate the following functions

i. $\int 5e^{-2x} dx$ **(2 Marks)**

ii. $\int_1^2 (6x^2 - 3x + 5) dx$ **(3 Marks)**

b) A firm's marginal cost function is

$$MC = Q^2 + 3Q + 8. \text{ Find the total cost function } TC \text{ if the fixed costs are 250 units of money.} \quad \mathbf{(4 \text{ Marks})}$$

c) Given that the marginal propensity to consume

$$MPC = 0.15 + \frac{0.2}{\sqrt{Y}}, \text{ Where } Y \text{ denotes income, find the consumption}$$

function C and saving function S if the consumption is 135 units when $Y=100$ money units. **(6 Marks)**

QUESTION FOUR (15 MARKS)

- a) Find the consumer's surplus if the demand function is $P = 17 - 5Q$ when the demand Q is 2 **(4 Marks)**
- b) Find the producer's surplus at $Q = 5$ if the supply function is $P = 7 + 4Q$ **(4 Marks)**
- c) A company's marginal cost function is given by $MC = 100 - 2Q + 0.6Q^2$ Calculate the extra cost in increasing production from:
- 5 to 10 units **(2 Marks)**
 - 10 to 15 units **(2 Marks)**
- d) If you save £500 at a fixed interest rate of 6% paid annually:
- How much will you have after 10 years **(1 Marks)**
 - How long will you have to wait to double your initial investment? **(2 Marks)**

QUESTION FIVE (15 MARKS)

- a) Suppose you invest £1000 for two years in the bank which pays interest at an equivalent annual rate of 8%
- How much will you have at the end of one year if the bank pays interest annually? **(2 Marks)**
 - How much will you have at the end of one year if the bank pays interest quarterly? **(2 Marks)**
 - How much will you have at the end of 5 years if the bank pays interest monthly? **(3 Marks)**
- b) The prize in a lottery is £5000 but the price will be paid in two years' time. A friend of yours has the winning ticket. How much would you be prepared to pay to buy the ticket if you are able to borrow and save at an interest rate of 5%? **(2 Marks)**
- c) At equity bank, Ken takes out a \$100000 mortgage at an interest rate of 4.8% for a loan period of 30 years. What is the monthly payment? **(3Marks)**
- d) You invest \$3000 annually in an annuity from Mersenne Fund Annuities that earns 6.57% interest. How much is the investment worth after 18 years? Round to the nearest cent. **(3 Marks)**

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