MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2018/2019 ACADEMIC YEAR
SECOND YEAR FIRSTSEMESTER

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

COURSE CODE: ECO 2106
COURSE TITLE:CALCULUS FOR ECONOMISTS I

DATE: 7TH DECEMBER, 2018 **TIME: 8.30 – 10.30 A.M**

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 **THREE**printed pages. **Please turn over.***

SECTION A (25 MARKS)

Question one (25 Marks)

a. Given a function $f(x) = 10x^5 - 5x^4 + 2x^2 + x$ find:
   i. $f(2)$**(2 Marks)**
   ii. $f'(-3)$**(2 Marks)**

b. The fixed costs of producing a good are 10 and the variable costs are $4 + 6Q$ per unit
   i. Find expressions for total cost, TC and average cost, AC**(4 Marks)**
   ii. Evaluate TC and AC when $Q = 14$**(4 Marks)**

c. Suppose that the total cost to an electronics company of producing Q flat screens televisions is $TC = 780Q + 10000$ obtain an expression for the average cost function and find the average cost of production When Q is very large **(4 Marks)**

d. Differentiate the following functions:
   i. $\sqrt[3]{x}$**(2 Marks)**
   ii. $y = \frac{1}{x^8}$**(2 Marks)**

e. Differentiate the function $(x) = x^6 + 2x$. Hence calculate the slope of the graph of $y = x^6 + 2x$ at the point $x = 4$**(3 Marks)**

f. Find expression for $\frac{d\pi}{dQ}$ for the profit function $\pi = 2Q^3 + 30Q^2 - 20Q - 10$

(2 Marks)

SECTION B (45 MARKS)

Question two (15 Marks)

a. If the average cost function of a good is $AC = 2Q + 6 + \frac{13}{Q}$
   i. Find an expression for marginal cost, MC (3 **Marks)**
   ii. If the current output is 15, estimate the effect on TC of a 3-unit decrease in Q**(4 Marks)**

b. If the demand function is $P = 120 - 3Q$
   i. Find an expression for TR interms of Q**(3 Marks)**
   ii. Find the value of MR at $Q = 10$ using differentiation and a 1 unit increase approach**(5 Marks)**

Question three (15 Marks)

a. Differentiate $y = \frac{3-2x}{3+2x}$**(4 Marks)**
b. Find y' and y'' given $x^2 - xy + y^2 = 3$**(6 Marks)**
c. If the total revenue function, TR of a good is given by $100Q - Q^2$
   i. Write down an expression for the marginal revenue function, MR **(2 Marks)**
   ii. If the current demand is 70 estimate the change in the value of TR due to a 3-unit increase in Q**(3 Marks)**

Question four (15 Marks)

a. Determine the elasticity of demand when the price falls from 136 to 119 given the demand function $P = 200 - Q^2$**(5 Marks)**
b. Given the demand function $P = 50 - 2Q$ find the elasticity when the price is 30. Is the demand inelastic, unit inelastic or elastic at this price?**(5 Marks)**
c. Given the demand function $P = -Q^2 - 4Q + 96$ find the price elasticity of demand when $P = 51$. If this price rises by 2%, calculate the corresponding percentage change in demand**(5 Marks)**

Question five (15 Marks)

a. Differentiate the following functions
   i. $y = (x^2 + 4)^2(2x^3 - 1)^3$**(4 Marks)**
   ii. $s = (t^2 - 3)^4$**(3 Marks)**
b. Find y', y'' and y''' at:
   i. the point (2,1) on $x^2 - y^2 - x = 1$**(4 Marks)**
   ii. the point (1,1) on $x^3 + 3x^2y - 6xy^2 + 2y^3 = 0$**(4 Marks)**

*******END*******