MURANGA UNIVERSITY COLLEGE

(A constituent College of Jomo Kenyatta University of Agriculture & Technology)

TOWN LEARNING CENTRE

ORDINARY UNIVERSITY EXAMINATIONS

2015/2016 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: HBC 2103

COURSE TITLE: MATHEMATICS FOR BUSINESS

DATE: 20th August, 2015 **TIME:** 2 HOURS

INSTRUCTIONS TO CANDIDATES

- Question ONE (1) is compulsory
- Answer ANY OTHER TWO questions
- Show all your workings

MRUC observes ZERO tolerance to examination irregularities

Question One (Compulsory)

a. Giving a valid example, explain the various ways in which sets can be specified (4 marks)

b. Obtain the sums of the following series

   i. $30 + 30(0.15) + 30(0.15)^2 + ...$ (3 marks)

   ii. $10 + 10(1.15) + 10(1.15)^2 + ...$ (3 marks)

c. Why is the price function also referred to as the "demand" function (2 marks)

d. Briefly explain the criteria that is used to determine whether a turning point is a maximum or a minimum turning point or a stationary point (3 marks)

e. Briefly explain the following types of functions specifying the general form for each

   i. Linear function (2 marks)

   ii. Quadratic function (3 marks)

f. When are two sets A and B said to be equal? (4 marks)

g. Define the following concepts as used in set theory

   i. Null Set (2 marks)

   ii. Finite set (2 marks)

   iii. Compliment of a set (2 marks)

Question Two

a. From the following function, calculate the gradient when x = 5. $y = 3x^2 - 4x + 8$ (3 marks)

b. Murang'a town campus offers a ten stage course in management. The fees arrangement is such that a student pays sh. 3000 in the first stage and provides for a regular increase of sh. 500 in successive every stage

   i. How much should a student enrolled for the course pay in the 7th stage (3 marks)

   ii. How much in total should a student pay to finish the course? (4 marks)

c. A machine producing company has the following marginal cost function: $MC(q) = 30q^2 - 80q + 5000$. If the firms fixed cost is sh. 16000; find

   i. The total cost function of the firm (6 marks)

   ii. Cost of producing 10 machines (4 marks)

Question Three

a. National water board carried out a survey on the sources of household water in a town estate and found out that 60% of the households used piped water, 48% had their own boreholes while 20% had their own boreholes and also used piped water. Using venn diagrams to illustrate your answer, find the percentage of households who;
   i. Got water from at least one of the sources (5 marks)
   ii. Did not get water from any of the two sources (5 marks)

b. Given the following function: $y = 24 + 6x^3 - 72x$, find the stationary points and identify whether the turning points in the function are minima or maxima (5 marks)

c. Differentiate $q = 3x^2 + x^4 - 2y^4 + 5y$ with respect to y (2 marks)

d. Evaluate $\int_{-2}^{2} 5L^4.\delta L$ (3 marks)

Question Four

a. A radio manufacturer can sell all the radios of a particular type that he produces. The total cost of producing q radios per week is given by 300q+2000. The company sold a radio for sh. 300 when 100 radios were demanded and sh. 480 when 10 radios are demanded.
Required
   i. Derive a linear price function per item (2 marks)
   ii. Derive the firms revenue function (2 marks)
   iii. What is the maximum revenue that the firm can achieve (3 marks)
   iv. Find the profit break even points (4 marks)
   v. Find the maximum profit and the price that maximizes the firms profit (4 marks)

b. A student wants to accumulate Sh.60,000 for a graduation party after his 4-year degree course. At 10% compound interest per annum, how much should the student deposit in a bank account at the end of every year to achieve his dream (5 marks)