MURANGA UNIVERSITY COLLEGE

(A CONSTITUENT COLLEGE OF JOMO KENYATTA UNIVERSITY OF AGRICULTURE & TECHNOLOGY)

MAIN CAMPUS

ORDINARY UNIVERSITY EXAMINATIONS

2015/2016 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF COMMERCE/ BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

COURSE CODE: HBC2103

COURSE TITLE: MATHEMATICS FOR BUSINESS

DATE: 14TH DECEMBER, 2015 **TIME: 2 HOURS**

INSTRUCTIONS TO CANDIDATES

QUESTION ONE (1) IS COMPULSORY
ANSWER ANY OTHER TWO (2) QUESTIONS

QUESTION ONE (30 MKS)

(a) Solve for x in $\log_3 (x + 1) - \log_3 (x - 1) = 1$ (4mks).

(b) If $\mathbf{A} = \begin{pmatrix} 2 & 3 & 1 \\ 0 & -1 & 5 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 1 & 2 & -6 \\ 0 & -1 & 3 \end{pmatrix}$

Find $3\mathbf{A} - 4\mathbf{B}$ (3mks).

(c) A person pays sh. 9,750 through monthly installments each less than the former by sh. 50. The first installment is sh. 1000. In how many installments will the amount be paid? (5mks).

(d) In a manager's club, 45 plays Polo, out of which 30 plays Polo only; 28 play Snooker, 25 play Tennis of which 11 play Tennis only. 7 play Tennis and Polo but not Snooker. 5 play Polo and Snooker, but not Tennis.

(i) Represent the above information in Venn diagram. (3mks).
(ii) How many play all the three sports. (2mks)
(iii) How many plays Snooker only? (2mks).
(iv) How many members are there in the club? (1mk).

(e) A trader bought 200 bags of sugar and 300 bags of rice for a total of sh. 85,000 from Karatina market. He also bought 90 bags of sugar and 120 bags of rice for a total of sh. 360,000 from Majengo market. Both the bag of sugar and the bag of rice cost the same price in the two markets. Using the matrix method determine the price of a bag of sugar and a bag of rice in the two markets. (5mks).

(f) The total cost function of a manufacturing firm is given by $C = 2x^3-x^2+3+5$ and the marginal revenue $MR = 8 - 3x$, where x represent output. Determine the most profitable output of the firm. (5mks).

QUESTION TWO (20 MKS)

(a) Mention five types of matrices. (5mks).

(b) A machine depreciates at 8% of its value at the beginning of a year. If the machine was purchases for sh. 15,000, what is the minimum number of complete years at which the worth of the machine will not exceed 2/5 of its original value? (5mks)

(c) A survey of 117 households was carried out in Malindi town to find out the number of households that watched televisions channels A, B and C respectively. The results of the survey were as follows.

42 of the households watched Channel A
52 of the households watched Channel B
51 of the households watched Channel C
11 of the households watched both channels A and C.
17 of the households watched both Channels B and C
5 of the households watched all the three channels.

(i) Present the above information in a Venn diagram. (4mks).
(ii) Find the number of households that watched only one channel. (2mks).
(iii) The number of households that watched none of the three channels. (2mks).
(iv) The number of households that watched at least two channels. (2mks).

QUESTION THREE (20 MKS).

(a) Evaluate $\int \frac{1}{(1-2x)2}$dx (5mks).

(b) If the total costs are C(x) = 1500 + 80x and total revenue are R(x) = 200 x-x^2.
(i) Find the break- even point(s). (4mks).
(ii) What level of production maximizes profit? (4mks).

(c) Find the minimum and the maximum values in the function y = $2x^3$+$5x^2$-4x+7. (7mks).

QUESTION FOUR (20 MKS).

(a) Mention any three properties of linear inequalities. (3mks).

(b) A diet of a sick person must contain at least 4000 units of vitamins, 50 units of minerals and 1400 units of calories. Two foods A and B are available at a cost of Sh. 4 and sh. 3 per unit respectively. One unit of food A contains 200 units of vitamins, 1 unit of minerals and 40 units of calories. One unit of food Bcontains 100 units of vitamins, 2 units of minerals and 40 units of calories. Formulate this problem as a linear programming problem. (5mks).

(c) The revenue and cost functions of central company limited are quadratic in nature. The following data was obtained from the company's records.

Quantity (q)	4	8	12
Revenue (R)	1,536	2,944	4,224
Total cost (C)	7,616	7,264	6,944

Find

(i)	Total revenue function.	(4mks).
(ii)	Total cost function.	(4mks)
(iii)	Profit function.	(2mks).
(iv)	Break-even point (s) in units	(2mks).