MURANGA UNIVERSITY COLLEGE

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

MAIN CAMPUS

SPECIAL/SUPPLIMENTARY UNIVERSITY EXAMINATIONS

2015/2016 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF COMMERCE

COURSE CODE: HBC2103

COURSE TITLE: MATHEMATICS FOR BUSINESS

DATE: **TIME:**

INSTRUCTIONS TO CANDIDATES

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

QUESTION ONE (30 MKS).

(a) A machine was purchased for Sh. 45,000 and sold as scrap for Sh. 5,000 after 10 years. Find the rate of depreciation of the machine. (4mks).

(b) Find a 2 x 4 matrix **X** such that
$2\mathbf{A} + 3\mathbf{X} = 5\mathbf{B}$ where (4mks).

$\mathbf{A} = \begin{bmatrix} 1 & 4 & 0 & 2 \\ 4 & 8 & -1 & 5 \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} -2 & 7 & 5 & 0 \\ 1 & 3 & 2 & 4 \end{bmatrix}$

(c) A home decorator manufactures two types of lamps, A and B. Both lamps go through two technicians, first a cutter and then a finisher. Lamp A requires 2 hours of the cutters time and 1 hour of the finisher's time. Lamp B requires 1 hour of cutters and 2 hours of finisher's time. The cutter has 104 hours and finisher has 76 hours of time available each month. Profit on lamp A is sh. 1600 and on the lamp B is Sh. 1200. Formulate the above problem as a linear programming problem. (4mks)

(d) Solve for x, y and z in the following simultaneous linear equations.
$4x + y + 2z = 7$
$7x - y + z = 7$
$3x + 4y + z = 8$ (7mks)

(e) Find the maximum and the minimum points of the expression.
$y = x^3 - 3x^2 - 9x + 27.$ (6mks)

(f) Solve for x in
$\text{Log}_3 (x + 6) + \text{Log}_3 (x - 2) = 2$ (5mks).

QUESTION TWO (20 MKS).

(a) The marginal cost function of a firm is $100 - 10x + 0.1\,x^2$. What is the total cost function and average cost function if the fixed cost is Sh. 500. (4mks).

(b) A club consists of members whose ages are in arithmetic progression, the common difference being 3 months, the youngest member of the club is just 7 years old. The sum of the ages of all members is 250 years. Find the number of members in the club. 4mks).

(c) A manufacturer can sell x items per day at a price P shillings each, where P = 125 – 5/3x. The cost of production for x items is $500 + 13x + 0.2x^2$. Find how much he should produce to have a maximum profit. Assuming that all items produced can be sold. (5mks).

(d) A green grocer has a stock of fruits comprising 900 boxes of oranges, 700 boxes of grapes and 400 boxes of pears. The table blow shows the market prices per box of the different types of fruits in four towns namely Nairobi, Nakuru, Kisumu and Mombasa.

MARKET RICE PER BOX (SH."000"			
TOWN	ORANGES	GRAPES	PEARS
Nairobi	4	2	3
Nakuru	5	1	2
Kisumu	4	3	2
Mombasa	3	2	5

Using matrix algebra, advice the green grocer on the town in which the stock of fruits should be sold in order to realize the maximum gross sales revenue. (7mks).

QUESTION THREE (20 MKS)

(a) Solve $2x^{1/3} + 8x^{-1/}3 - 8 = 0$ (5mks).

(b) Solve the following simultaneous linear equation using inverse matrix method.
$2x – 3y = 13$
$4x + y = 5$ (5mks).

(c) The sum of three numbers in an Arithmetic progression is 18 and their product is 192. Find the numbers. (6mks).

(d) Solve for x in $4^x – 3.\ 2^{x+2} + 2^5 = 0$ (4mks).

QUESTION FOUR (20 MKS).

(a) Mention five assumptions of linear programming. (5mks).

(b) An entertainment club sells Tickets based on sitting arrangement. The tickets are sold at Sh. 70 for the Executive section, Sh. 60 for the Balcony section and Sh 50 for the main section. The number of tickets sold for the Executives, main and Balcony sections and the relevant day of the week were as follows for a certain work.

	Executive	Main	Balcony
Thursday	1,500	1,250	600
Friday	1,300	1,300	520
Saturday	1,600	1,750	800

Using inverse matrix method, find the total sales made on the relevant days of the week. (5mks)

(c) News agency limited deals in the distribution of three types of Magazines namely Newsline, Informer and Update. The company recently conducted a market survey to determine the magazine preferences of 100 households in a certain town. The following results were obtained from the survey.

48 households read the Newsline magazine.
18 households read the informer magazine.
26 households read the update magazine.
8 households read the newsline and the update magazines.
8 households read the Newsline and informer magazines.
3 households read the update and the informer magazines.
3 households read the three magazines

(i) Represent the above information using a Venn diagram. (4mks).

(ii) Find the number of households that read none of the magazines . (2mks).

(iii) Find the number of households that read the exactly one type of magazine. (2mks).

(iv) Find the number of households that read at least two types of magazines. (2mks).