MURANGA UNIVERSITY COLLEGE

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

MAIN/TOWN CAMPUS

SPECIAL/ SUPPLIMENTARY UNIVERSITY EXAMINATIONS

2014/2015 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF COMMERCE

COURSE CODE: HBC2103

COURSE TITLE: MATHEMATICS FOR BUSINESS

DATE: 28TH OCTOBER 2015 **TIME: 2HOURS**

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is compulsory
Answer any TWO (2) questions

MRUC observes ZERO tolerance to examination irregularities

QUESTION ONE(30MKS)

a) A small manufacturing company produces and sells 10 to 50 units of its products per day. Its revenue function in shillings is given by $y=-x^2+100\ x$, where x is the number of units produced and sold. Obtain the number of units for which the revenue is maximum and obtain the maximum revenue. (4mks.)

b) Solve $6x^{1/3}+x^{-1/3}=5$ (6mks)

c. If the total costs are $C(x) = 500+90x$ and the total revenues are $R(x) = 150x - x^2$.

i. Find the break-even points (s)

ii. What level of productivity maximizes profit (6mks)

d. Mention four types of matrices (4mks)

e. Find the inverse of the matrix. (10mks)

$$A = \begin{pmatrix} 3 & 9 & 9 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{pmatrix}$$

QUESTION TWO(20mks)

a. Explain the following terms as used in set theory.

i. Intersection of set (2mks)

ii. Disjoint of sets (2mks)

b. A contractor for a construction job specifies a penalty for delay in completion beyond the agreed date as shs 1000 more than the previous day for each of the subsequent days. How much does a 30 day delay in completion cost the contractor? (6mks)

c. News Agency limited deals in the distribution of three types of magazines in Newsline Informer and Update. The company recently conducted a market survey to determine the magazine preference of sh100 households in a certain town. The following results were obtained from the survey.

- 48 households read the Newsline magazine

- 18 households read the Informer magazines
- 26 households read the Update magazines
- 8 households read the Update and the Informer magazines.
- 8 households read the Newsline and the Informer magazines.
- 3 households read the Update and the Newsline 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 the Newsline magazines but did not read the Informer magazines. (2mks)

iii. The number of households that read the Update magazines and the Informer magazines but did not read the Newsline magazine. (2mks)

iv. The number of households that read none of the magazines. 2mks.)

QUESTION THREE(20MKS)

a. If the demand function for a product is given by $p^2+2q-1600$ and the supply function is given by $200-p^2+2q=0$.Findthe equilibrium quantity and equilibrium price. (5mks)

b. Solve for x in$\text{Log}_3 (x+6) + \log_3 (x-2) = 2$. (5mks)

c. Solve the following simultaneous equations. (10mks)

$$3x+4y+3z=121,000$$
$$4x+3y+3z=126,000$$
$$4x+4y+2z=124,000$$

QUESTION FOUR(20MKS)

a. Explain the following terms as used in matrices.

i. Order of a matrix. (2mks)

ii. Square matrix. (2mks)

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

	Market price 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. (6mks)

c. If $\mathbf{A} = \begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 5 \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 1 & 2 & -6 \\ 0 & -1 & 3 \end{bmatrix}$

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

d. Find the minimum and the maximum values in the function $y = 2x^3+5x^2-4x+7$ (6mks).