



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**

COURSE CODE: HBC2103

COURSE TITLE: MATHEMATICS FOR BUSINESS

DATE: 21ST APRIL 2016

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

**Question ONE (1) is Compulsory
Answer ANY OTHER TWO (2) questions**

MRUC observes ZERO tolerance to examination irregularities

This Paper Consists of 2 Printed Pages. Please Turn Over. ►

QUESTION ONE (30mks)

- (a) Explain the following terms as used in set theory. (4mks)
- (i) Universal set.
 - (ii) Null set
 - (iii) Subset
 - (iv) Disjoint sets
- (b) Solve the inequality $-1 < 3 - 2x < 9$. (3mks).
- (c) A manufacturer of TV sets produced 600 units in the third year and 700 units in the seventh year. The increase in production is the same.
- Calculate
- (i) the total production in 7 years. (5mks)
 - (ii) the production in the 10th year. (2mks).
- (d) Differentiate with respect to x the function $y = x^3 (2x - 1)$ (4mks)
- (e) In producing a certain product, the total costs can be represented by $C(x) = 1600 + 1500x$ and the total revenues can be represented by $R(x) = 1600x - x^2$,
- (i) Find the break-even points (s) (4mks)
 - (ii) Find the maximum possible profit. (4mks).
- (f) The total cost function of a product is given by $C(x) = x^3 - \frac{615}{2}x^2 + 15,750x + 18,000$

Where x is the number of units produced. Determine the number of units that must be produced to minimize total cost. (4mks).

QUESTION TWO (20mks)

- (a) Solve for x in the equation $\text{Log}_2(x + 7) = 2 - \text{log}_2(x + 4)$. (5mks).
- (b) In a development plan of a city a contractor has taken a contract to construct certain houses for which he needs building materials like stones, sand etc. There are three firms A, B, and C that can supply him these materials. At one time these firms A, B and C supplied him 40, 35 and 25 truckloads of stones and 10, 5 and 8 truckloads of sand respectively. If the cost of one truckload of stone and sand are sh. 1200 and sh. 500 respectively, find the total amount paid by the contractor to each of these firms. (5mks).
- (b) A quick survey of 1,000 children in a refugee camp produced the following results.
- 320 children were fed on beans.
 - 200 children were fed on rice.
 - 450 children were fed on potatoes.
 - 150 children were fed on beans and potatoes.
 - 70 children were fed on beans and rice.

100 children were fed on rice and potatoes.
300 children were fed on none of three types of food.

- (i) Present the above information in the form of a Venn diagram. (4mks)
Find
- (ii) The number of children who were fed on all the three types of food. (2mks).
- (iii) The number of children who were fed on exactly one of the three types of food. (2mks).
- (iv) The number of children who were fed on at least two types of food. (2mks).

QUESTION THREE (20mks)

- (a) (i) How many terms are there in the series 2, 4, 8,, 128. (3mks).
- (ii) An Arithmetic progression has 3 as its first term. Also, the sum of the first 8 terms is twice the sum of the first 5 term. Find the common difference. (4mks).

- (b) The sum of two numbers is 12 and the sum of their squares is 80. Find the numbers. (4mks).

- (c) A manufacturer can sell x units of a product per week at a price $P = 100 - 2x$ each. The cost of producing x units is $C(x) = 25x + 1000$, Determine the number of units the manufacturer should produce to maximize his profit. (5mks).

(d) $\mathbf{A} = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}$

Find \mathbf{AB} . (4mks)

QUESTION FOUR (20 MKS)

- (a) Find the inverse of the matrix. (13mks).

$$\mathbf{A} = \begin{bmatrix} 4 & 5 & 6 \\ 1 & 2 & 3 \\ 9 & 5 & 7 \end{bmatrix}$$

- (c) A company produced a product with sh. 18,000 as fixed costs. The variable cost is estimated to be 30% of the total revenue when it is sold at a rate of sh. 20 per unit, find the total revenue, total cost and profit function. (4mks).

(d) 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 $3\mathbf{A} - 4\mathbf{B}$

(3mks).