



(The University Of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
KISUMU CITY CAMPUS**

**2015/2016 ACADEMIC YEAR
FIRST YEAR SECOND SEMESTER EXAMINATIONS
FOR THE DEGREE
OF
BACHELOR OF COMMERCE**

COURSE CODE: BCB 105

COURSE TITLE: BUSINESS MATHEMATICS

DATE: SEPTEMBER 2016 TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

- Answer question one (compulsory) and any other two questions.

Question 1 (25 Marks)

- a) Differentiate between column and vector matrix using illustrative examples **3 marks**
- b) Extract a matrix from the following equation

$$X + Y + Z = 6$$

$$X - Y + Z = 2$$

$$X + 2Y - Z = 2$$

Use the matrix to solve the values of X, Y, Z using the following methods

- i. Cramer's rule
- ii. Inversion method
- iii. Gaussian elimination

9 marks

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

Quantity (q)	4	8	12
Revenue (R)	1536	2944	4224
Total Cost (C)	7616	7264	6944

Required

- i) Total revenue, total cost, and profit functions **10 Marks**
- ii) Breakeven point in units **3 Marks**

Question 2 (15 Marks)

- a) Consider a firm that sells its product for a price of £60 per unit. The firm has fixed costs of £200,000 per month and total variable costs per month (TVC) given by: $TVC=10Q$ Where Q is the monthly quantity produced and sold by the firm.

- (i) Find the firm's break-even level of monthly output. **2 marks**
- (ii) What quantity should the firm produce and sell to make a profit of £5,000 per month?

3 marks

- b) Mr. Shah is the head of accountancy department in a city commercial college. Prior to admitting students for a certain course he analyses their grades in mathematics, English and commerce at the entry qualification examination. From a list of 250 applicants, Mr. Shah found the following

104 applicants had passed in mathematics

- 123 applicants had passed in commerce
 117 applicants had passed in English
 20 applicants had passed in all the three subjects
 28 applicants had passed in mathematics and commerce
 39 applicants had passed in English and commerce
 All applicants had passed at least one of the subjects.

Required

- i. Represent the above information in a Venn diagram
- ii. How many applicants has passed only one subject
- iii. Mr. Shah decided to admit students those who passed at least two subjects. How many did he admit **10 marks**

Question 3 (15 Marks)

- a) A hypothetical 2 sector economy has the following input – output relationship technological matrix A

$$A = \begin{matrix} & \begin{matrix} \text{User} \\ \text{A} & \text{B} \end{matrix} \\ \begin{matrix} \text{Producer} \\ \text{P} \\ \text{Q} \end{matrix} & \begin{pmatrix} 0.3 & 0.2 \\ 0.1 & 0.4 \end{pmatrix} \end{matrix}$$

Suppose final demand for a particular planning period is estimated as Ksh 4500 for sector P and Ksh 1800 for Sector Q.

- i) Determine the level of output required for each sector so that both intermediate demand and final demand is satisfied.
 - ii) Determine the total worth of primary input for both sector P and Q
 - iii) Account for the usage of sector P output
 - iv) Account for the usage of sector Q input **10 marks**
- b) Define a Venn diagram and differentiate between union and intersection using Venn diagrams **5 marks**

Question 4 (15 Marks)

- a) A chocolate manufacturer produces two types of chocolate bars, Cadbury and Minty. Production of Cadbury bar uses 10g of cocoa and 1 minute of machine time and production of a Minty bar uses 5g of cocoa and 4 minutes of machine time. Altogether 2000g of cocoa and 480 minutes of machine time are available each day. The manufacturer makes profit of 10sh from each Cadbury bar and 20sh profit from each Minty bar. The manufacturer seeks to maximize profit. **Required**
- i) Formulate the linear programming model. **3 marks**
 - ii) Graphically solve the problem formulated in (i) **4 marks**
 - iii) Range of feasibility for the two constraints and various profit amounts **4 marks**
- b) What annual rate of compound interest would be necessary in order for £750 to grow to £1,264 by the end of 5 year? **4 marks**

Question 5 (15 Marks)

- a) Differentiate between the present value of an annuity and the future value of an annuity **3 marks**
- b) A customer deposits ksh250 every 3 months into a building society account that pays interest at a rate of 8% per annum convertible quarterly (i.e. compounded every 3 months). How much money will be in the account at the end of 10 years? **4 marks**
- c) A Wiseman put ksh 1500 at the end of every year in a child education trust when she turned three years old girl at the beginning of the year. If the amount is compounded annually at the rate of 2.5% how much will the child receive when she turns 18 years? **4 marks**
- d) A man borrows Ksh 20000 and agrees to pay the borrowed amount in 10 equal installments at the rate of 6% per annum. Find the amount of each installment, the first being paid year after the money was borrowed. **4 marks**