OFFICE OF THE DEPUTY VICE CHANCELLOR
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2024 /2025 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER MAIN EXAMINATION

FOR THE DEGREE OF

BACHELOR OF BUSINESS MANAGEMENT

COURSE CODE: BBM 113

COURSE TITLE: BUSINESS MATHEMATICS

DATE: 15/01/2025 **TIME: 2:00-5:00PM**

INSTRUCTION TO CANDIDATES

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MAIN EXAM

BBM 113: BUSINESS MATHEMATICS 1

STREAM: BBM **DURATION: 3 Hours**

INSTRUCTIONS TO CANDIDATES

*i. Answer Question **ONE** and any other **TWO** questions.*

ii. Maps and diagrams should be used whenever they serve to illustrate the answer.

iii. Do not write on the question paper.

Question One (30 Marks)

1. Explain five applications of mathematics in business management (5 marks)
2. Define the following terms as used in set theory:
   - i. Finite set (2 marks)
   - ii. Null set (2 marks)
3. Consumption. C is a function of income, Y, given by the following expression:

   C=10+0.45Y

   - i) Determine the slope of the consumption function (1 mark)
   - ii) Is the function positively or negatively sloped? Give reason. (2 marks)
   - iii) What is the level of consumption when Y= 20 (1 mark)
4. For the universal set T= (a,b,c,d,e,f) and its subset A=(a,d), B=(b,c,f) and C=(a,c,e,f)

   Find:

   - i. (AUB)nC' (2 marks)
   - ii. AUBUC (2 marks)
5. Solve for x in each of the following:

   (a) $3(3^x) = 27$ (2 marks)

   (b) $(0.125)^{x+1} = 16$ (2 marks)
6. Use Cramer's rule to solve the following simultaneous equation (4 marks)

   $x + 2y = 3$

   $3x + 4y = 1$
7. Discuss the importance of set theory in the modern business environment (5 marks)

Question Two

a. Define the following terms and give an example of each.

i. Square matrix (2 marks)

ii. Diagonal matrix (2 marks)

iii. Transpose matrix (4 marks)

b. The following table shows the Fixed Cost (F) and the Variable cost (V) of producing 1 unit of X and 1 unit of Y:

	Product	
	X	Y
Cost F (Ksh '000)	5	8
Cost V (Ksh '000)	4	12

When X units of X and Y are produced, the total fixed cost is Shs 640,000 and total variable cost is shs. 820,000. Express this information as a matrix equation and hence find the quantities of X and Y produced using matrix algebra.

(12 marks)

Question Three

i. Verify that (AUB)' = A'nB' (4 marks)

ii. Of the 112 students from college of Education, 19 read both Accountancy and Sociology, 70 read Accountancy or Sociology but not French, 27 read Sociology but not Accountancy or French. 53 read Sociology or French but not Accountancy, 19 read French but not Accountancy or Sociology and 8 read Accountancy and French but not Sociology. Assume that each student reads at least one of these courses. How many of the students read:

(i) All three courses? (8 marks)

(ii) Only one course? (4 marks)

(iii) Only two courses? (4 marks)

Question Four

i. Outline four basic assumptions of linear programming (4 marks)

ii. Consider the linear problem.

Maximize $Z=10X_1 + 20X_2$

Subject to

$6X_1 + 8X_2 \leq 48$

$X_1 + 3X_2 \leq 12$

Solve the linear problem using simplex method (16 marks)

Question Five

Consider two products P and Q where P controls 60% of the market. Each week brand switching takes place that of those who bought P in previous week 20% shift to Q while those who bought Q the previous week 60% buy it again.

Required

i. Find the market share in week three (7 marks)

ii. Find the equilibrium market share (7 marks)

iii. Assuming the transition matrix used in (i) and (ii) above is for the first month, find the transition matrix for the second month. (8 marks)