(*Knowledge for Development*)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER
MAIN EXAMINATION

FOR THE DEGREEOF BACHELOR OF COMMERCE

COURSE CODE:BCO122

COURSE TITLE:BUSINESS MATHEMATICS

DATE:9ᵀᴴ SEPTEMBER,2022   **TIME:**9.00AM – 11.00AM

INSTRUCTIONS TO CANDIDATES

1. Answer Question One in Section A and Any other TWO (2) Questions in Section B

2. Question **one** carries **30**marks and each of the other two questions carry **20** marks each.

TIME: 2 Hours

KIBU observes ZERO tolerance to examination cheating

This Paper Consists of 6 Printed Pages. Please Turn Over.

QUESTION ONE

a) Differentiate between the following pairs of terms as used in business mathematics.

    I)   Simple interest and compound interest   2mks

    II)   Amortization and sinking fund   2mks

b) If $f(x) = 4x^2 - 3x + 5$, for what values of x is $3f(x) = f(3x)$?   3mks

c) Solve

$$2x + 3y = 1$$
$$x^2 - xy = 6$$

                                    3mks

d) A radio manufacturer finds that he can sell x radios per week at ksh p each where

$p = 2(100 - 0.25x)$. His cost of production of x radios per week is $ksh(120x + 0.5x^2)$. Find the number of radios to be produced and sold in a week to yield a profit of ksh 1,600.   4mks

e) The production (P) of a firm for a commodity is $P = 15K + 2LK - L^2 - 0.5K^2$ where L and K denote Labor and Capital respectively. The relationship between L and K is $L + K = 4$. If production isn11.5 units, find labor units.

                                    4mks

f) Let $A = \{2,3,4,5\}$, $B = \{3,6,9\}$ and $C = \{5,6,7,8\}$. Find;

    i) $(A \cup B) \cap (B \cup C)$ 2mks

    ii) $A \cap n(B \cup C)$ 2mks

g) A man lends ksh 1,800 to two persons at the rate of 4% and 4.5% simple interest per annum respectively. At the end of 6 years, he receives ksh 462 from them. How much did he lend to both of them?   3mks

h) Evaluate three limitations of linear programming.   3mks

i) Let $A = \begin{pmatrix} 2 & 2 \\ 3 & -3 \end{pmatrix}$

Find the inverse of matrix A.   2mks.

QUESTION TWO

a) The compound interest on a certain sum of money for two years is ksh 920.25 and the simple interest is ksh 900. Find the sum and the rate of interest.   10mks

b) A certain sum of money invested on compound interest amounts to ksh 2,420 in 2 years and ksh 2,662 in 3 years. Find the rate of interest and the sum invested.   10mks

QUESTION THREE

a) Write short notes under the following sub headings as used in set theory.
   I)   Subset of a set   2mks
   II)   Equality of sets   2mks
   III) Disjoint sets   2mks
   IV)   Universal set   2mks
   V)   Complement of a set   2mks

b) Of the 100 boarders in a hostel, 80 drink tea, 40 drink coffee and 25 drink both tea and coffee. How many drink neither tea nor coffee?   5mks

c) In a group of 50 people, 35 speak Hindi, 25bspeak both English and Hindi and all the people speak at least one of the two languages.
   I)   How many people speak only English and not Hindi?   2mks
   II)   How many people speak English?   3mks

QUESTION FOUR

a) Solve the following systems of linear equations using crammers rule

$3x+y+2z=3$

$2x-3y-z=-3$

$X+2y+z=4$ 10mks

b) Consider an economy consisting of three sectors: Agriculture, Manufacturing and services. The hypothetical flow of goods and services in physical units is summarized in the following table.

	Agriculture	Manufacturing	Services	Final demand
Agriculture	60	180	0	120

| Manufacturing | 30 | 60 | 30 | 180 |
| Services | 0 | 40 | 10 | 100 |

If the demand changes to (150   160   180), what should be the new output?

10mks

QUESTION FIVE

a) Jane Mbevi intends to borrow sh 600,000 from a bank. The bank has offered to lend her the money at an interest rate of 10% per annum repayable in four annual installments.

Required:

i)   The annual payment necessary to amortize the loan.   4mks

ii)   Loan amortization schedule for Jane Mbevi.   6mks

b) Tom lent sh 10,000 to two persons in two parts. The first man borrowed at 5% simple interest and the second man borrowed at 6% simple interest per annum. If Tom receives sh 12,240 as total amount after 4 years, what sum was borrowed by each of the persons?   10mks