



(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR
FIRST YEAR FIRST SEMESTER
MAIN EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(AGRICULTURAL EDUCATION AND
EXTENSION/AGRICULTURE AND BIOTECHNOLOGY)

COURSE CODE: MAP 111 A

COURSE TITLE: FOUNDATION MATHEMATICS

DATE: 13/12/2022

TIME: 9:00 AM - 11:00 AM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 4 Printed Pages. Please Turn Over.

QUESTION ONE (30 MARKS)

- a). Define
- (i). Scalar product (2mks)
 - (ii). Cross product (2mks)
 - (iii). Polynomial (2mks)
 - (iv). Universal set (2mks)
 - (v). Complement of a set (2mks)
- b). Given that $\vec{u} = (12,7)$ and $\vec{v} = (3, -7)$, find
- (i). $\vec{u} + \vec{v}$ (2mks)
 - (ii). $2\vec{u} - 3\vec{v}$ (3mks)
- c). Find the sum of multiples of 15 between 12 and 173. (5mks)
- d). Find the values of the following. (3mks)
- (i). $\sin 30^\circ$
 - (ii). $\cos 45^\circ$
 - (iii). $\tan 60^\circ$
- e). Find the equation of a linear function which goes through the points $(-3, 5)$ and $(-2, 2)$ (3mks)
- f). what is the value of x in $\log_2(x) = 7$. (4mks)

QUESTION TWO. (20 MARKS)

- a). The sum of three consecutive terms of an arithmetic progression is 18 and their product is 120. Find the terms. (4mks)
- b). Find the sum of the first 12 terms in the geometric progression 3, 6, 12, 24, (6mks)
- c). The first term of an arithmetic progression is 7 and the last term is 70; if the sum of the series is 385. Find the common difference. (5mks)
- d). Find the sum to infinity for the series $24 + 12 + 6 + \dots$ (5mks)

QUESTION THREE (20 MARKS)

a). Let the set $P = \{ 1, 3, 5, 7, 9, 11, 13 \}$, set $Q = (2, 3, 9, 15)$ and $U =$ (positive integers)
Determine using Venn diagram

- i). $P \cup Q$
- ii). $P \cap Q$
- iii). $P - Q$
- iv). $P \Delta Q$

(4mks)

b). If A and B are 2 non empty sets and U the universal set. Draw a Venn diagram to represent the following.

- i). $A \cup B$
- ii). $A \cap B$
- iii). $B - A$
- iv). $B \Delta A$

(4mks)

c). In a college of 600 students, 200 were taking mathematics and 300 were taking computer while 130 were taking both mathematics and computer. Using a venn diagram,

- i). Find the number of students in college who are not registered for either course. (3mks)
- ii). How many students were registered for mathematics only. (3mks)

d). Given the universal set $U = \{ 1, 2, 3, 5, 6, 7, 8, 10, 11 \}$,
Set $A = \{ 1, 3, 6, 8, 11 \}$, $B = \{ 2, 6, 8, 10 \}$ and $C = \{ 1, 3, 5, 7, 11 \}$

Find

- i). $A \cap B^c$
- ii). $A \cup B$
- iii). A^c
- iv). $B \cup C$
- v). $B \cap C^c$
- vi). $A - C$

(6mks)

QUESTION FOUR. (20 MARKS)

a). Solve the equation $3^{2x} = 27$ (4mks)

b). Solve for x given that

$$\frac{1}{2} \log_2 9 + \log_2 (5x - 4) = 7 \quad (4mks)$$

c). Using the polynomial $f(x) = x^4 - 10x^2 + kx + 4$

If $f(x)$ is divided by $(x + 2)$ the remainder is 10. Find K. (6mks)

d). Show that $x - 3$ is a factor of $f(x)$ given $f(x) = 2x^3 - 5x^2 - 9$. (6mks)

QUESTION FIVE (20 MARKS)

a). Express $\frac{11x + 12}{(2x + 3)(x + 2)(x - 3)}$ in partial fractions (10mks)

b). Solve the equation.

$$\frac{x^2 + 4x}{3} + \frac{84}{x^2 + 4x} = 11 \quad (5mks)$$

c). Find the equation of the plane through the point $(1, 2, 3)$ and perpendicular to the vector

$$4i + 5j + 6k \quad (5mks)$$