(Knowledge for Development)

KIBABII UNIVERSITY

MAIN EXAMINATION

UNIVERSITY EXAMINATIONS

2020/2021 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER

FOR THE DEGREE OF BACHELOR OF SCIENCE

COURSE CODE: **MAP 111A**

COURSE TITLE: **FUNDAMENTALS/FOUNDATION MATHEMATICS I**

DATE: 21/5/2021 **TIME:** 9 AM - 11 AM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 3 Printed Pages. Please Turn Over.

QUESTION ONE (30 MARKS)

a. Given that set A={1,4,6,8}, B = {0,2,4,8,9} and U = { the digits}. Draw a Venn diagram for A ∩ B (3 marks)

b. Find the partial fraction decomposition of $\frac{X-3}{X^3+3X}$ (8 marks)

c. Find the sum of the multiples of 3 between 28 and 112. (6 marks)

d. Use the remainder theorem to evaluate $f(x) = 6x^4 - x^3 - 15x^2 + 2x - 7$ at x =2 (3 marks)

e. Show that $f(x) = x^2$ is an even function (3 marks)

f. Find the values of $\sin 60^0$, $\cos 45^0$ and $\tan 45^0$ (3 marks)

g. Find

i. $\vec{u} + \vec{v}$

ii. $\vec{u} - \vec{v}$ if $\vec{u} = (3, 4)$ and $\vec{v} = (6, -2)$ (4 marks)

QUESTION TWO (20 MARKS)

a. Define the following

i. Disjoint sets (2 marks)

ii. B is proper subset of A (2 marks)

iii. Union of A and B (2 marks)

b. U is the set of whole numbers from 1 to 15. A is the set of multiples of 3. B is the set of primes. Create a Venn diagram to show the following relationships

i. $A^{/}$

ii. A ∩ B

iii. A∪ B (9 marks)

c. If U = {1, 2, 6, 7, 8, 9, 10), A = { 1, 2, 3, 4}, B = { 1, 2, 3, 5, 7 } and C = { 2, 4, 5 }. Find

i. A ∩ B (1 mark)

ii. A U B (1 mark)

iii. A' (1 mark)

iv. A ∩ C (1 mark)

v. A U C (1 mark)

QUESTION THREE (20 MARKS)

a. Find the sum of the multiples of 5 between 28 and 112 (5 marks)

b. Write down the 11^{th} term in the geometric progression 1, 3, 9, ... (4 marks)

c. Find the number of terms in the geometric progression 6, 12, 24, ..., 6144 (4marks)

d. Find the sum to infinity for the series 48 + 24 + 12..... (3 marks)

e. Express the recurring decimal 0.242424.... as a vulgar fraction (4marks)

QUESTION FOUR (20 MARKS)

a. What is x in $\log_3(x) = 5$ (3 marks)

b. Calculate y in $y = \log_4 (1/4)$ (3 marks)

c. Simplify $\log_a ((x^2 + 1)^4 x^{½}$ (3 marks)

d. Decompose the following

$$\frac{x^5 - 2x^4 + x^3 + x + 5}{x^3 - 2x^2 + x - 2}$$ (11 marks)

QUESTION FIVE (20 MARKS)

a. Show that (x- 3) is a factor of $x^3 - 6x^2 - x + 30$. Find the remaining factors. Use the factors to determine the zeros of the polynomials. (7 marks)

b. Show that the function y = 2x -3 is neither (5 marks)

c. If $f(x) = x + 3$ and $g(x) = 3x^2 + 4x + 1$, find

i. f(g(x)). (3 marks)

ii. g.f(x). (5 marks)