MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF PURE AND APPLIED SCIENCE

DEPARTMENT OF APPLIED SCIENCE

UNIVERSITY ORDINARY EXAMINATION

2017/2018 ACADEMIC YEAR

FIRST YEAR **SECOND** SEMESTER EXAMINATION FOR DIPLOMA IN INFORMATION TECHNOLOGY

AMM 050 – BASIC MATHEMATICS

DURATION: 2 HOURS

DATE: 20TH APRIL 2018

TIME: 9.00AM – 11.00AM

Instructions to Candidates:

1. Answer **Question 1** and **Any Other Two** questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A – ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE

a) Define the following terms:

i. Set

ii. Asymmetric matrix (2 marks)

b) Use the truth table to show the compound propositions $(P \wedge r) \vee (P \vee \sim q)$ (4 marks)

c) Given the set A = {1,2,3,4}. Find P(A) (3 marks)

d) Find the determinant in each of the following matrices

i. $A = \begin{pmatrix} 3 & 1 \\ 2 & 4 \end{pmatrix}$ (1 mark)

ii. $B = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 4 & 1 & 1 \end{pmatrix}$ (2 marks)

e) How many different six figures phone numbers are possible if its digits are allowed except that the first digit must be 7,8,9? (3 marks)

f) Given that $f(x) = 2x + 1$ and $g(x) = x^2 + 2x - 3$. Find:

i. $f \circ g(x)$

ii. $g(-6)$ (3 marks)

g) Using long division method find $x^3+2x+7 \div x-4$ (4 marks)

h) Factorize $6x^2+11y+3$ (2 marks)

i) i. Convert 9583 to Octal form (2 marks)

ii. Convert 245_{10} into binary (2 marks)

j) Solve $x^2+7x-3=0$ by completing square method (2 marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO

a) Given $f(x) = 2x + 4$ and $g(x) = -3x + 4$. Show that $(f \circ g)^{-1} = (g \circ f)^{-1}$ (6 marks)

b) In how many ways can Andrew select 3 different types of sodas from 30 available kinds and 10 different packets of biscuits from 12 available packets? (4 marks)

c) Use the truth table to show the compound propositions $(P \wedge \neg q) \rightarrow r$ (6 marks)

d) Given set A={a,b,c} and set B={1,2,3} show that AxB ≠ BxA (4 marks)

QUESTION THREE

a) Use Cramer's rule to solve the following system of linear equations

2x + 3y - z = 1

3x + 5y + 2z = 8

x - 2y - 3z = 1 (10 marks)

b) Given that $x = \begin{pmatrix} 3 & 2 \\ -4 & 5 \end{pmatrix}$ and $y = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$. Find

i. 3x+2y (3 marks)

ii. $(3x+2y)^T$ (1 mark)

c) Given the expressions

$x^4 - 3x - x^2$, $-x^3 - 2x^3 + 3x$ and $3x^2 - 4x - 5$

Add and subtract vertically (6 marks)

QUESTION FOUR

a) Consider the following universal set ∪ defined as ∪= {1,2,3,4,5,6,7,8,9,10}. Consider other three sets defined as

A = {1, 3, 4, 5}

B = {4, 5, 6, 2}

C = {1, 5, 7, 10}

i. Represent the sets A, B, C and ∪ in venn diagram (5 marks)

ii. Find the following

1. A∪B
2. $(A \cap B)^1$
3. A∩ (B ∪ C)
4. (A∪ B) ∩ C
5. C – A (5 marks)

b) Solve for P and q using the matrix method

$$\begin{pmatrix} P & 2q \\ 2P & 3q \end{pmatrix} \begin{pmatrix} 1 \\ 2 \end{pmatrix} = \begin{pmatrix} 5 \\ 12 \end{pmatrix}$$ (3 marks)

c) Solve the following system of linear equations using the Cramer's method

x + 3y + 2z = 3

2x + 4y + 2z = 8

x + 2y - z = 10 (7 marks)