MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF PURE AND APPLIED SCIENCE

DEPARTMENT OF APPLIED SCIENCE

UNIVERSITY ORDINARY EXAMINATION

2017/2018 ACADEMIC YEAR

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

AMM050 – BASIC MATHEMATICS

DURATION: 2 HOURS

DATE: 7TH DECEMBER 2017

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 (Compulsory)

QUESTION ONE (30 Marks)

a) List down the two types of a triangular matrix and give an example in each. (4 Marks)

b) Find the determinant in each of the following matrices

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

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

c) Given that $\begin{pmatrix} x+y & 2s+r \\ x-y & s-r \end{pmatrix} = \begin{pmatrix} 4 & 6 \\ 2 & 3 \end{pmatrix}$ solve for x, y, s and r (5 Marks)

d) i) Differentiate between a tautology and a Fallacy. (2 Marks)

ii) Determine whether $p \wedge \neg p$ is a tautology or Fallacy. (3 Marks)

e) Solve $x^2 + 7x - 3 = 0$ by completing square method. (4 Marks)

f) How many different six figure phone numbers are possible if its digits are allowed except that the first digit must be 7, 8 or 9. (3 Marks)

g) Evaluate ${}^{10}C_4$ (4 Marks)

SECTION B (Answer any two questions)

QUESTION TWO (20 Marks)

a) Consider the following universal set U defined as U= {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}. Consider other three sets A, B, and C defined by A = {1, 3, 4, 5}, B = {4, 5, 6, 2} and C = {1, 5, 7, 10}

i. Represent the sets A, B, C and U in a Venn diagram. (5 Marks)

ii. Find the following;

1. $C - A$
2. $A \cup B$
3. $(B \cup C)'$
4. $(A \cap B)'$
5. $(A \cup B) \cap C$
6. $A \cap (B \cap C)$ (12 Marks)

b) Calculate the discriminate of the equation $3x^2 + 5x - 1 = 0$ (3 Marks)

QUESTION THREE (20 Marks)

a) Solve for p and q using the matrix method

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

b) Define Asymetrix matrix and hence find the values of w, x, y and z if the matrix A is symmetric

$$A = \begin{pmatrix} 2 & 6 & 9 \\ w & y & z \\ x & 7 & 3 \end{pmatrix}$$ (5 Marks)

c) Solve the following system of equations using inverse matrix method

$$\begin{aligned} x + 3y + 2z &= 3 \\ 2x + 4y + 2z &= 8 \\ x + 2y - z &= 10 \end{aligned}$$ (10 Marks)

QUESTION FOUR (20 Marks)

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

$$\begin{aligned} 2x + 3y - z &= 1 \\ 3x + 5y + 2z &= 8 \\ x - 2y - 3z &= -1 \end{aligned}$$ (12 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) Solve the following simultaneous equations by inverse matrix method.

$$\begin{aligned} 2x + 3y &= 13 \\ x - 2y &= -4 \end{aligned}$$ (4 Marks)

QUESTION FIVE (20 Marks)

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

b) In how many ways can James 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 $(p \wedge \neg) \rightarrow r$ (6 Marks)

d) Given the set $X = \{a, b, c\}$ find

i. $|p(x)|$

ii. $p(x)$ (4 Marks)