THE TECHICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

CERTIFICATE IN BUILDING & CIVIL ENGINEERING (CT I 12S)

AMA 1108: ALGEBRA

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: FEBRUARY 2013
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*
- *Mathematical Tables*

This paper consists of **FIVE** questions.

Answer any **THREE** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One

a) Use the formula method to solve $2t^2 + 5t + 2 = 0$ **(4 marks)**

b) Solve $x^2 + 5x - 49 = 0$ by completing the square. **(6 marks)**

c) Solve $6x^2 + 11x - 10 = 0$ by factorization. **(4 marks)**

d) Given $A = \{1,2,3,4,5,6,8\}\ B = \{1,2,4,6,8,10\}\ C = \{3,6,9\}$ state the elements of:

(i) $A \cap B$

(ii) $B \cap C$

(iii) $A \cap C$

(iv) $A \cap (B \cap C)$

(v) $B \cup (A \cap C)$

(vi) $A \cap (B \cup C)$ **(6 marks)**

Question Two

The following experimental values of x and y are related by the law of $y = ax^2 + b$. Plot a suitable and test if this is so. Find approximate values of a and b.

x	0	1	2	3	4	5	6
y	3.0	4.8	12.0	23.3	38.1	59.5	83.5

Find the value of y when x = 10 **(20 marks)**

Question Three

a) Evaluate the following using logarithms and show your working.

(i) $8^{-2/3}$

(ii) $\left(2\frac{1}{4}\right)^8$

7^{-3}

(iii) **(5 marks)**

b) Write the following in terms of $\log 2,\ \log 3$ and $\log 5$:

$$\log \frac{\left(625\times\sqrt[5]{32}\right)}{\left(\sqrt[5]{243}\right)}$$

(4 marks)

$\log_{16} 8$

Without using log tables evaluate **(2 marks)**

c) Solve the simultaneous equation

$$2x + y - z = -9$$
$$3x - 2y + 4z = 5$$
$$-2x - y + 7z = 33$$

(10 marks)

Question Four

a) Solve the simultaneous equation:

$$3x - 2y = 0$$
$$4x + y + 11 = 0$$

(4 marks)

b) Using calculator evaluate correct to (4 s.g):

$$\frac{e^{0.25} - e^{0.25}}{e^{0.25} + e^{-0.25}}$$

(4 marks)

c) Evaluate:

$$\frac{15^4 \times \left(15^2\right)^8}{\left(15^5\right)^4}$$

(i) **(3 marks)**

$\ln\ 0.241$

(ii)

$\ln 5/2$

(iii)

$\ln 12.32$

(iv) **(5 marks)**

d) Evaluate showing your working:

12_{C_5}

(i)

$P(15,4)$

(ii) **(4 marks)**

Question Five

a) (i) Define a complex number. **(1 mark)**

(ii) Given $Z1 = \left(y + j^2\right)$ and $Z_2 = \left(-3 + j^8\right)$. Find:

(a) $Z_1 Z_2$ **(3 marks)**

(b) $\left|Z_1 + Z_2\right|$ **(2 marks)**

(c) $\frac{Z_2}{Z_1}$ **(4 marks)**

b) Evaluate $4\angle 60^o + 3\angle -60^o - 5\angle -135^o$ giving answers in (i) Cartesian form (4 s.f) polar form. **(10 marks)**