THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

CERTIFICATE TECHNICIAN I
CT1 09A

AH 1102 : CERTIFICATE ALGEBRA

END OF SEMESTER EXAMINATIONS

MAY 2010 SERIES

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination:

- Answer booklet
- Pocket Calculator/Mathematical tables

This paper consists of **FIVE** Questions.
Answer Question **ONE** and any other **TWO** Questions.
Maximum marks for each part of a question are as shown.

Question ONE

(a). Given the digits 0, 2, 4, 6, find:

(i). How many numbers can be formed using the digits, without repetition.
(ii). How many of the numbers in (i) above i.e. between 60 and 6000 (inclusive). **(9 Marks)**

(b). The first term of a G.P is 16 and the fourth term is -2. If the sum of the terms is $10\frac{5}{8}$, find the number of terms. **(11 Marks)**

(c). Use De Moivre's theorem to solve the equation $Z^3 = 1$, giving your solution in the form $Z = a + bj$. **(10 Marks)**

Question TWO

(a). (i). Use binomial theorem to obtain the first four terms of $\left(1+\frac{x}{2}\right)^{-\frac{1}{3}}$.

(ii). Use the expansion in (i) above to evaluate $(7.92)^{\frac{1}{3}}$ correct to four decimal places.

(10 Marks)

(b). Given the complex numbers $E_1 = 3-2j$ and $Z_2 = 1-3j$, find $Z_1 \times Z_2$, Z_1 / Z_2, $Z_2^{\,2}$ and represent them on an argand diagram. **(10 Marks)**

Question THREE

(a). Three sets, A, B and C are as follows:

$A = \{M, A, T, H, S\}$

$B = \{A, L, G, E, B, R\}$

$C = \{G, E, O, M, T, R, Y\}$

Universal set, $\sum = \{The\ alphabeth\}$. Represent the sets in a ven diagram, hence find:-

(i). $n(A \cap B \cap C)$
(ii). $n(A \cap B \cup C)$
(iii). $n(A \cup B \cup C)'$ **(7 Marks)**

(b). A project team of 7 persons is to be selected from 6 technicians and 10 craftsmen. Find the number of possible selections, if the team comprise at least 2 technicians and 2 craftsmen. **(10 Marks)**

(c). Find the constant terms in the expansion of, $\left(1-\frac{x}{2}\right)^6$ **(3 Marks)**

Question FOUR

(a). Given the series $10.5+12.0+13.5+.....+25.5.$
Find:
(i). The sum of all the terms
(ii). The seventh term

(10 Marks)

(b). In a storage yard, PVC pipes are arranged in rows on top of one another such that each row contains one less than the row beneath. If the top row consists of a single pipe, find:

(i). How many rows are there if the total number of pipes is 36.
(ii). How many pipes are in the bottom row.

(10 Marks)

Question FIVE

(a). Find how long it would take a sum of money to increase by 80% when invested at 4½% compound interest. **(6 Marks)**

(b). Find the tenth term and the sum of the first 20 terms for the series, $125-20+16.....$, correct to 3 decimal places. **(6 Marks)**

(c). The product of three numbers in an A.P 15 21.7 and their sum is 8.4. Find the numbers. **(8 Marks)**