THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE II)
DIPLOMA IN CIVIL ENGINEERING (DCEN II)

AMA 2101: ALGEBRA

END OF SEMESTER EXAMINATION

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

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

- *Answer booklet*
- *Mathematical table*
- *Pocket calculator*

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

This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question 1

a) Use logarithms to evaluate:

$$\frac{3.28\times(5.86)^2}{\sqrt{0.1486}\times 4.56}$$

(8 marks)

b) Solve the following equations:

(i) $$\frac{2x-1}{x-1}=\frac{3x-4}{x+4}$$

(ii) $$3(x-1)+(x-1)^2=1$$

(12 marks)

c) Use binomial theorem to expand $\left(1-\frac{1}{2}x\right)^6$ up to the fifth term. Hence find the value of $(0.96)^6$ correct to three decimal places (10 marks)

SECTION B (Answer *any TWO questions from this section*)

Question 2

a) Two quantities x and y are related by a law of the form $y=kb^x$. Using the values given in the Table 1, verify the law graphically. Hence find the approximate values of the constants k and b.

Table 1

x	1	2	3	4	5
y	2.9	6.2	12	25	46

(10 marks)

b) The second term of a G.D is 1.6 and the fifth term is -25. Find:

(i) The tenth term
(ii) The sum of the first ten terms (10 marks)

Question 3

a) A project team of 5 is to be selected from 4 Engineers and 7 technicians. Find;

(i) The total number of possible teams
(ii) The number of possible selections if the team must comprise at least 1 Engineer an 2 Technicians (10 marks)

b) Given the series 10½ + 12 + 13½ + …….+ 27 find;

(i) The eighth term
(ii) The sum of all the terms of the series (10 marks)

Question 4

a) Convert the following complex numbers into polar form:

(i) $z = -3 + 45$
(ii) $z = 5 - 25$ (8 marks)

$$z^3 = \left(8, \frac{2\pi}{3}\right)$$

b) Use Demoivre's theorem to find z given **,** giving your solution in the form $z = a + bj$ (12 marks)

Question 5

$$p = kq^n,$$

a) Given that find the values of the constants k and n, if the following sets of values satisfy the relationship: $p = 20, q = 10$ and $p = 50, q = 64$. (6 marks)

$$y = 2 + 4x - x^2$$

b) Plot the graph of for x values from -1 to $+5$ and use it to solve the equations:

(i) $4x = x^2 + 1$

(ii) $3x - x^2 + 1 = 0$ (14 marks)