THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

CERTIFICATE IN CONSTRUCTION TECHNICIAN I

AMA 1101: ALGEBRA I

END OF SEMESTER EXAMINATION

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer booklet*

This paper consists of **FIVE** questions in **TWO** sections **A** & **B**
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) Simplify the following leaving the answer in positive indices

$$\frac{\left(\frac{1}{32}\right)^{-3} \times \left(\frac{1}{16}\right)^{2}}{\left(\frac{7}{8}\right)^{2} \div \left(\frac{1}{4}\right)^{2}}$$

(6 marks)

b) Using logarithms solve:

$$x^{-0.22} = 0.222$$

(5 marks)

c) (i) Using completing square method, solve the equation

$$x^2 - 5x + 3 = 0$$

(ii) Use graphical method to solve equations

$$y^2 = 4x \quad \text{and} \quad y = x+1 \quad \text{where} \quad 0 \le x \le 5$$

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

Question 2

a) Solve the equation

$$\log_3(2x+4) - 2 = \log_3(x-5)$$

(5marks)

b) (i) Draw the graph of

$$y = 2x^2 - 3x - 5$$

(ii) Use the graph obtained in b (i) to solve

$$2x^2 - 2x - 10 = 0$$

(15 marks)

Question 3

a) Solve the following equations:

(i)

$$2^{2x+2} - (17)2^x + 4 = 0$$

$$6T_1 + 4T_2 + 3T_3 = 7$$
$$T_1 + 2T_2 + 3T_3 = 2.2$$
$$2T_1 + T_2 = 2.0$$

(ii)

b) The following data is related by a law of the form: (10 marks)

$$s = ut + \frac{1}{2}gt^2$$

where u and g are constants

t(sec)	1	2	3	4
5(m)	15.3	40.6	75	120

(i)   Use graphical method to determine the law

(ii)   Determine the value of s when $t = 2.5$ sec (10 marks)

Question 4

a) Use logarithms to solve:

$$x^{-0.4} = 4.5$$

(5 marks)

b) Solve the following:

$$\frac{x+1}{5} + \frac{4}{x+2} = 3$$

(i)

$$2e^{2x} - 3e^x - 9 = 0$$

(ii) (9 marks)

c) A construction firm requires experts in 3 trades. 1 painter, 1 carpenter and 1 surveyor will be needed in first year. In the second year, 1 painter, 2 carpenters and 3 surveyors will be needed while in the third year, 1 painter, 4 carpenters and 5 surveyors will be needed. At the end of first year, at total of kshs. 15 million will be required to pay the experts. At the end of second and third year, kshs 28 million and kshs 46 million respectively will be needed to pay the experts. Find the payment rate for each trade. (6 marks)

Question 5

a) Solve the following equations simultaneously

$$\log 2_a + \log 2_b = 2$$
$$\log 2_a 56 - \log_b^4 = 1$$

(7 marks)

b) The voltage V is thought to be related to displacement x during an experiment by a law of the form:

$V = Kx^n$ where K and n are constants

x	3.4	4.5	6.5
v	182	224	309

    (i)   Use the data to determine the law graphically

    (ii)   Find the voltage required to achieve a displacement of 4cm   (13 marks)