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 II

AMA 1110: GEOMETRY II

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: MAY/JUNE 2012

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 **I & II.**
Answer question **ONE** plus any other **TWO** questions
Maximum marks for each part of a question are clearly shown
This paper consists of **FOUR** printed pages

SECTION I (COMPULSORY)

Question 1 (Compulsory – 30 marks)

a) If $\underset{\sim}{a} = 2\underset{\sim}{i} + \underset{\sim}{j} - 3\underset{\sim}{k}$ and $\underset{\sim}{b} = (3\underset{\sim}{i} + 2\underset{\sim}{j} - 4\underset{\sim}{k}$

Find (a + b) (1 mark)

(a – b) (1 mark)

|a + 2b| (2 marks)

b) Simplify

(i) $2i + 3k \times j$ (2 marks)

(ii) $(5i + 2j + 4k) \times \left(\underset{\sim}{i} + \underset{\sim}{j} \right)$ (2 marks)

(iii) $\left(2\underset{\sim}{j} \right) \bullet \left(\underset{\sim}{i} + \underset{\sim}{j} + \underset{\sim}{k} \right)$ (2 marks)

c) Use the diagram below figure1 to calculate

(i) Length of the arc ACB (2 marks)

A

(ii) Area of sector ADB (5 marks)

d) Express as polar equations (3 marks)

(i) $y = x^2$

$x^2 + y^2 = 9x$

(ii)

e) Express as Cartesian equation (4 marks)

$r = 3 - \sin\theta$

f) A solid cone has a base of radius 3.5cm and a height 7.5cm. Find:
(i) The volume of the cone (2 marks)
(ii) The total surface area of the cone (4 marks)

SECTION II (Answer any TWO questions)

Question 2 (20 marks)

a) (i) Find the equation of a line passing through (4,3) and parallel to line $2x - 5y = 1$ (5 marks)

(ii) Find, the equation of the straight line passing through (0,4) and (3,10) (4 marks)

b) State the gradient and $y -$ intercept of : (6 marks)

(i) $3x + y = 4$

(ii) $\frac{x}{4} - \frac{2y}{3} = 1$

c) The cost of producing various quantities of a particular article is shown in the table below

Cost (c) in sh	125	225	275
Number of articles (N)	100	300	400

If the relationship of C and N is by $C = aN + b$, where a and b are constants.

Find the value of a and b (5 marks)

Question 3 (20 marks)

a) Calculate the volume of a square based frastrum of height 8cm, base and top width 12cm and 4cm respectively 10 marks

b) Point M is (3, 0, -3) and N is (1, 2, -7).

$\underset{\sim}{OM}$, $\underset{\sim}{ON}$, $\underset{\sim}{i}, \underset{\sim}{j}$ and $\underset{\sim}{k}$

(i) Express the position vector of M and N, in terms of (2 marks)

(ii) Find $\underset{\sim}{OM} . \underset{\sim}{ON}$ (2 marks)

(iii) Find OM x ON (3 marks)

(iv) Area of triangle OMN (3 marks)

Question 4 (20 marks)

A frustrum of a cone has a height of 3.5cm. The base diameter is 4cm and the top diameter is 3cm

figure 2

Find:

(i) The total surface area of the frustrum

(ii) The total volume of the frustrum

Question 5 (20 marks)

a) Complete the following for

$r = 2(1+\cos\theta)$

θ^O	0	30	60	90	120	150	180	210	240	270	300	330	360
R	4							0.27					

(5 marks)

$r = 2(1+\cos\theta)$

Hence plot the polar graph of (4 marks)

b) An ellipse has an equation

$$\frac{x^2}{16}+\frac{y^2}{9}=1$$

i) Find the
- Foci (3 marks)
- x and y intercepts (3 marks)

ii) sketch the ellipse (5 marks)