



**UNIVERSITY EXAMINATIONS 2013/2014 ACADEMIC YEAR**

**1<sup>st</sup> YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF  
EDUCATION SCIENCE, BACHELOR OF EDUCATION ARTS,  
BACHELOR SCIENCE, BACHELOR OF ARTS**

**COURSE CODE/TITLE: SMA B103 ANALYTICAL GEOMETRY**

**END OF SEMESTER: II**

**DURATION: 3 HOURS**

**DAY/TIME: THURSDAY 8.00 TO 11.00AM**

**DATE: 9.04.2014 (LTN)**

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**QUESTION ONE [40 MARKS]**

a) Find an equation for a circle centered at (1, -5) and tangent to the line  $3x+4y = 8$  [4 marks]

b) Show that  $2 - \tan^2 A = 2\sec^2 A - 3\tan^2 A$  [3 marks]

c) A curve has the equation  $x = \frac{\sqrt{144-16y^2}}{3}$ . Find the equation of the

i) tangent at  $\left(2, \frac{3\sqrt{3}}{3}\right)$  [5 marks]

ii) Normal at  $\left(2, \frac{3\sqrt{3}}{3}\right)$  [5 marks]

d) A portion of the white house lawn is in the form of an ellipse. It is 1060 feet long and 890 feet wide. Write an equation for the lawn [4 marks]

e) In a rectangle ABCD, the equation of line AB is  $2y = x+3$ . Given that the coordinate of C is (3,2) find i) the equation of BC ii) the equation of CD and iii) the coordinate of B [6 marks]

f) Given that  $\sin A = \frac{12}{13}$  where  $90 < A < 180$  and  $\tan B = \frac{4}{3}$  where  $180 < B < 270$ , find

i)  $\sin(A-B)$  ii)  $\cos(A-B)$  iii)  $\tan(A-B)$  [9 marks]

g) Find the polar form of the  $Z = -1 + \sqrt{3}$  [4 marks]

**QUESTION TWO [15 MARKS]**

- a) Draw the graph of  $y=2\sin (2x+30)$  and that of  $y = \cos (x+10)$  on the same set of axes for  $0 < x < 360$ . [8 marks]
- b) Using your graph
- i) To find the amplitude and the translation factor of each graph [4marks]
- ii) Solve the equation  $2\sin (2x+30)-\cos(x+10) = 0$ . [3 marks]

**QUESTION THREE [15 MARKS]**

- a) Show that the general equation of an ellipse with horizontal major axis is  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  [7 marks]
- b) Show that the area of an ellipse is given by  $A = \pi ab$  [8 marks]

**QUESTION FOUR [15 MARKS]**

- a) Solve the equation  $\cos 3x + \cos x = 0$  [6 marks]
- b) Express each of the following in the form  $R\sin(x \pm \alpha)$  where  $R > 0$  and  $|\alpha|$  is as small as possible
- i)  $8\cos x - 6\sin x$  ii)  $-8\cos x + 6\sin x$  [9 marks]