**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2014/2015**

**YEAR 1 SEMESTER I EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE/INFORMATION TECHNOLOGY**

**SMA 2104: MATHEMATICS FOR SCIENCES**

**DATE: APRIL 2015 TIME: 2 HOURS**

**INSTRUCTIONS: Answer Question One and Any Other Two Questions**

**QUESTION ONE (30 MARKS)**

1. Rationalize the denominators of the following, hence simplify;
2. $$\frac{1}{2+\sqrt{3}}$$
3. $\frac{1-\tan(30^{0})}{1+\tan(30^{0})}$ (5marks)
4. The roots of the equation $2x^{2}-4x+1=0$ are α, and β. Find the values of
5. $$\frac{1}{α}+\frac{1}{β}$$
6. $α^{2}+β^{2}$ (5marks)
7. i. Solve $\left(4^{x}\right)^{3}=2^{12}$ (3marks)

ii. Simplify $\frac{9^{\frac{1}{2}}x8^{\frac{1}{2}}}{2^{\frac{1}{2}}}$ (3marks)

1. i. Use Binomial theorem to evaluate $\left(1.002\right)^{5}$ correct to6 d.p (5marks)

ii. Calculate the mean, and standard deviation of the measurements;

 2.29, 2.36, 2.31, 2.39, 2.33, 2.25 (5marks)

1. A bag contains 5 red balls, and 7 white balls. Find the probability of drawing 2 white balls in two draws such that;
2. The balls drawn not being replaced
3. The balls drawn being replaced after each draw (4marks)

**QUESTION TWO 20 marks)**

1. Solve the equation

$log\_{3}x-4log\_{x}3+3=0$ by first changing to base 3 (10marks)

1. i. Write down the 12th term in the expansion $\left(2-x\right)^{15}$

ii. Write down the term containing $x^{4}$ in the binomial expansion of $\left(1-2x\right)^{12}$ (10marks)

**QUESTION THREE (20 marks)**

1. In an arithmetic progression, the sum of the first five terms is 30, and the third term is equal to the sum of the first two terms. Write down the first five terms of the progression (10marks)
2. The roots of the equation $2x^{2}-4x+1=0$ are α, and β. Find an equation with integral coefficients whose roots are α-2, and β-2 (10marks)

**QUESTION FOUR (20 marks)**

1. Solve the trigonometric equation

$2sin^{2}x+\sin(x)-1=0$, 0≤x≤2$π$ (10marks)

1. Write $3\cos(θ)+4\sin(θ)$ in the form $Rcos(θ-α)$, hence, solve the equation

$3\cos(θ)+4\sin(θ)=2$ (10marks)