**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2014/2015**

**YEAR 3 SEMESTER I EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY**

**SMA 2102: CALCULUS II**

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

**INSTRUCTIONS: Answer questions ONE and ANY OTHER TWO questions.**

**QUESTION ONE**

1. Find the slope of the curve $x^{2}-y^{3}=0$ at the point $(1, 1)$ (4marks)
2. The gradient function of a curve is given as $y^{1}=1-2x$. Find the equation of this curve given that it passes through the point $P\left(\frac{1}{2}, -1\right)$ (5marks)
3. Evaluate $\int\_{-1}^{2}x\left(x^{2}+1\right)^{4}dx$ (5marks)
4. Calculate the exact area bounded by the curve $y=\frac{x^{2}}{1+x}$ and the x-axis from $x=0$ to $x=2$ (6marks)
5. Use the trapezoidal rule with $n=5 $to estimate $\int\_{0}^{2}\sqrt{\frac{x}{x+1}}dx$ (9marks)

**QUESTION TWO (20 MARKS)**

1. Differentiate the following functions with respect to $x$;
2. $$xcosy=1$$
3. $$x=\sqrt{t}$$
4. $y=\frac{t^{2}-4}{4}$ (6marks)
5. Decompose the function $f(x)=\frac{x^{2}+1}{x^{3}-x}$ into partial fractions and hence evaluate $\int\_{}^{}\left(\frac{x^{2}+1}{x^{3}-x}\right)dx$ (10marks)
6. Evaluate $\int\_{}^{}\frac{1}{x^{2}+4x+20}dx$ (4marks)

**QUESTION THREE (20 MARKS)**

Use appropriate integration rules to obtain the integrals below;

1. $\int\_{}^{}sinxcos^{2}x dx$ (3marks)
2. $\int\_{}^{}\frac{2x-3}{x^{2}+5x-6} dx$ (6marks)
3. $\int\_{}^{}xlnx^{2} dx$ (4marks)
4. $\int\_{}^{}\frac{\sqrt{x}}{1+x}dx$ (5marks)
5. $\int\_{}^{}\frac{2}{x^{2}+2x+5} dx$ (2marks)

**QUESTION FOUR (20 MARKS)**

1. Find the mean value of the function y=$\frac{x}{x^{2}+1}$ over the interval [0, 2] (5marks)
2. The area bounded by the curve $y=x^{2}-4$ and the x-axis is revolved about the x-axis. Calculate the volume of the solid generated (7marks)
3. Find the arc length of the graph of $y=\frac{2}{3}x^{\frac{3}{2}}+1$ from $x=0$ to $x=1$ (5marks)
4. Evaluate $\int\_{}^{}\frac{1}{\sqrt{4-x^{2}}} $dx (3marks)

**QUESTION FIVE (20 MARKS)**

1. Find the area between the curves $y=x^{2}+2x+1$ and $y=2x+2$ (6marks)
2. Use the Simpson’s rule with $n=6$ to estimate $\int\_{-1}^{2}\sqrt{1+x^{4}} dx$ (9marks)
3. Show that the volume of a sphere radius r is given by $V=\frac{4}{3}πr^{2}$ (5marks)