**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2015/2016**

**FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF**

**BACHELOR OF SCIENCE INFORMATION TECHNOLOGY**

 **SMA 2101: CALCULUS I**

**DATE: APRIL, 2016 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

1. Define the following terms as used in calculus:
2. Limit of a function f(x) [2 marks]
3. A continuous function [2 marks]

 Hence evaluate:  [3 marks]

1. From the first principle, find  of y = [5 marks]
2. Find the equations of both lines (normal and tangent)

through (1, -2) to the curve y = 3x2 – ½ x [6 marks]

1. Evaluate  given
2. y =  [3 marks]
3. y = (9x2 +4) ½  [3 marks]
4. Evaluate the following;
5.  [2 marks]

1.  [2 marks]
2. If f(x) =  find f1 (x) [2 marks]

**QUESTION TWO (20 MARKS)**

1. The curve of the function f(x) = passes

through the point (1, 0) and has a stationery point at (1, 0).

Find the values of and . [5 marks]

1. The distance 5 metres travelled by a body in t seconds is

given by S =  - + 6t + 5

 Determine:

1. The velocity and acceleration at the start. [4 marks]
2. The value of t when the body is at rest. [6 marks]
3. The value of t when the acceleration is 37 m/s2 [2 marks]
4. The distance travelled in the third second. [3 marks]

**QUESTION THREE (20 MARKS)**

1. From the definition of the derivative show that if

 y = Then,  = [4 marks]

1. i) Determine the co-ordinates of the maximum and

 minimum values of the graph y =  -  + 

 and distinguish them [11 marks]

ii) Sketch the graph. [5 marks]

**QUESTION FOUR (20 MARKS)**

1. Find the derived function of the following:
2. f(x) = (x2 - 1) (7x2 – 4x + 7) [3 marks]
3. f(x) =  [5 marks]
4. Given that f(x) = x3 + 3x2 +5x +k; and f(1) = 0,

find the value of k and f (½ ) [3 marks]

1. Use the first principle to find the derivative of y = x4 [5 marks]
2. Determine the differential coefficient of y =  [4 marks]

**QUESTION FIVE (20 MARKS)**

1. From the first principle, find  of y =  [5 marks]
2. A dynamite blast blows a heavy rock straight up with a launch

velocity of 160 m/s. It reaches a height of S = 160t – 16t2 metres

after t sec.

1. How high does the rock go [3 marks]
2. What are the velocity and speed of the rock when it is

256 m above the ground on the way up?

On the way down? [4 marks]

1. What is the acceleration of the rock at any time t

 during its flight? [2 marks]

1. When does the rock hit the ground again. [2 marks]
2. Evaluate  as a function of t if x = t - t2 and y = t - t3 [4 marks]