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**University Examinations 2015/2016**

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

**SMA 3112: CALCULUS I**

**DATE: AUGUST, 2016 TIME: HOURS**

**INSTRUCTIONS:** *Answer question* ***one Compulsory*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Evaluate :

(3Marks)

1. Investigate the differentiability of the following function at x = 2(4 Marks)



1. Using first principles, find the derivative of;

(4 Marks)

1. Find the values of K and m such that the function below is continuous everywhere;

(4 Marks)

1. Differentiate the following functions with respect to x:
2.  (3 Marks)
3. = (3 Marks)
4. Find the maximum and minimum values of the curve; . (4Marks)
5. Determine the equation of the normal line drawn to the ellipse;

at (5 Marks)

**QUESTION TWO (20 MARKS)**

1. Evaluate the following limits:
2.  (4 Marks)
3.  (3 Marks)
4. Given that (Sin 2x + Cos x), Find (3 Marks)
5. Determine the turning points of the function; (6 Marks)
6. Given , find hence or otherwise find (x). (4 Marks)

**QUESTION THREE (20 MARKS)**

1. State three conditions that must be satisfied by a function in order to conclude that its continuous at a point x = a (3 Marks)
2. Discuss the continuity of the function;

(5 Marks)

1. Find for the following functions:
2. y = (4 Marks)
3. (3 Marks)
4. The path of a particle moving in a straight line is given by:

. Find:

1. S and acceleration (a) when velocity (V) = 0 (4 Marks)
2. The time when direction of motion changes. (1 Mark)

**QUESTION FOUR MARKS)**

1. Find the derivative of the following functions:
2. (4 Marks)
3. (2 Marks)
4. Given that x = Sin 2t and y = t – Sin t, find (3 Marks)
5. Find the rate of change of the volume of a cone if = 2 inches per minute and h = 3r. When r = 6 inches. (5 Marks)
6. Given that y = , show that ;

(6 Marks)

**QUESTION FIVE (20 MARKS)**

1. The parametric equations of a cycloid are ;

x = 4(t – sin t) and y = 4(1 – Cos t). Show that ;

 (8 Marks)

1. A company manufacturing calculators determined that the daily total cost of producing x calculators (in dollars is : C(x) = 0.0001- 0.08+40x +5000
2. Find the marginal cost of producing 600 calculators. (3 Marks)
3. Interpret your results in (i) above. (2 Marks)
4. Find the equations of the tangent and normal lines to the curve:

at the point (1,2). (7 Marks)