****



**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**P.O. Box 972-60200 – Meru-Kenya.**

**Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411**

**Fax: 064-30321**

**Website:** [**www.must.ac.ke**](http://www.must.ac.ke) **Email:** **info@must.ac.ke**

**University Examinations 2015/2016**

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY

**SMC 3122: DIFFERENTIAL AND INTEGRAL CALCULUS**

**DATE: AUGUST, 2016 TIME:** $2$**HOURS**

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

**QUESTION ONE (30 MARKS)**

1. (i) Define a limit. (2 Marks)

$ $

(ii) Evaluate the limit; (2 Marks)

 

1. Explain why the function given below is discontinuous at the point given;

 at the point x = 2 (2 Marks)

1. Find the equation of the tangent to the curve y at the point (2,-1). (3 Marks)
2. Find the derivative of the function using the first principle. (4 Marks)
3. Find the derivatives of the functions;
4.  (3 Marks)
5.  (3 Marks)
6. A dynamic blast blows a heavy rock straight up with a launch velocity of 50m/sec. It reaches a height of S = (49t –$ 49t^{2}$)m after t seconds.
7. How high does the rock go? (3 Marks)
8. When does the rock hit the ground again? (3 Marks)
9. Evaluate the integrals;
10.  (2 Marks)
11.  (3 Marks)

**QUESTION TWO (20 MARKS)**

1. Evaluate the integral;
2.  (5 Marks)
3. Find the value of ; (6 Marks)

 

1. Find the derivative of the function ;

$y= \left(2x+1\right)^{3}$ (3 Marks)

1. Use the trapezoidal rule with 4 strips to estimate  (6 Marks)

**QUESTION THREE (20 MARKS)**

1. Evaluate the integrals;
2.  (6 Marks)
3.  (4 Marks)
4. A manufacturer wants to design an open box having a square base and surface area of 108cm2. What dimensions will produce a box with minimum volume? (6 Marks)
5. Find the turning points of the curve  and classify them. (4 Marks)

**QUESTION FOUR (20 MARKS)**

a) Differentiate (f(x) = $2\sqrt{x}$ from the first principles. (6 Marks)

b) Find the equation of the tangent and the normal to the curve at the point p(1,1)

(4 Marks)

c) Evaluate the area enclosed by the curve, , the x-axis and the ordinates x = 1 to x = 4; (3 Marks)

d) Find;

 (7 Marks)

**QUESTION FIVE (20 MARKS**)

1. Find of the following functions;
2.  (3 Marks)
3.  (3 Marks)
4.  (3 Marks)
5. The distance S metres moved by a car in time t seconds is given by;

. Determine the velocity and acceleration when t = 0 Second and when t = $^{3}/\_{2}$Sec. (6 Marks)

1. Calculate the value of;

  using trapezoidal rule with 5 equal intervals. (5 Marks)