



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHS PHYSICS

**UNIVERSITY EXAMINATION FOR:
DIPLOMA IN ANALYTICAL CHEMISTRY [YEAR 1 SEM 2]**

AMA 2103 CALCULUS FOR SCIENCE

**END OF SEMESTER EXAMINATION
MAY SERIES**

MAY 2016

TIME: 2HRS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. **ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS**

Do not write on the question paper.

QUESTION ONE (30MKS)

a) Determine the equation of a straight line passes through $Q(4, 1)$ and is Perpendicular to line

$$y = x - 2 \quad [3\text{mks}]$$

b) Determine if $f(x)$ is continuous at $x = 2$ given that $f(x) = \frac{8x}{2-x}$ [5mks]

c) Evaluate $\lim_{x \rightarrow 4} \frac{x^2-16}{x-4}$ [4mks]

d) Determine the equation of a straight line through 'A(8, 2) and B(6, 4) [3mks]

e) Determine the maximum value of y if $y = -0.01x^2 + 10x + 20$ [5mks]

QUESTION TWO

- a. Determine the equation of perpendicular to curve $y = 2x^2 + 2$ at $x = 1$ [5mks]
- b. Find the equation of a normal to the curve $y = 2x^3 - 24x + 4$ at $x=1$ [5mks]
- c. find $g \circ f$ given $g(x) = 2x - 2$ and $f(x) = 3x^2 + 2x + 2$ hence find $g \circ f(1)$ [5mks]
- d. Given that the $p = x^3 - 9x^2 + 1000$; determine the minimum and maximum values of p [5mks]

QUESTION THREE

- a) Determine the value of x where the gradient of the curve $y=x^2-27x+18$ is equal to 1 [4mks]
- b) Use Simpson rule to evaluate $\int_2^5 x^2 dx$ with $n=6$ [6mks]
- c) Find the inverse of the function $h \circ h(1)$ given that $h(x) = 2x - 4$ [6mks]
- d) Find the area under the curve $y = x^2$ from between $x = 2$ to $x = 4$ [4mks]

QUESTION FOUR

- a. A straight line passes through A(1 2) B(4 6) and C (x, 4) find the value of x [5mks]
- b. Determine $f^{-1}(1)$ given $f(x) = \frac{x}{2x+4}$ [5mks]
- c. Find the value of x and y where the gradient of the curve $y= x^3-4x$ is equal to 23 [5mks]
- d. Determine the maximum value of y if $y= .001x^2-0.8x+10$ [5mks]

QUESTION FIVE

- a) Find the second derivatives of the following curves
- i. $y = 3x^3 + 2x^2 + 10x$ [3mks]
- ii. $y = (x^2 + 1)^2$ [4mks]
- iii. $2y = 2x^2 + 3x + 4$ [3mks]
- b) Find the area under the curve $y = x + 3$ between $x=-2$ and $x=2$ [5mks]

c) Investigate the continuity of the curve $y = \frac{x^2-16}{x-4}$ at $x = 4$

[5mks]