# TECHNICAL UNIVERSITY OF MOMBASA

**FACULTY OF PURE AND APPLIED SCINCES**

**DEPARTMENT OF MATHS AND PHYSICS**

## UNIVERSITY EXAMINATION FOR:

**UPGRADING MATHS**

**AMA 1003 CALCULUS**

## END OF SEMESTER EXAMINATION

**MAY SERIES**

**TIME: 2HRS**                                                  **MAY 2016**

**Instructions to Candidates**
You should have the following for this examination
-*Answer Booklet, examination pass and student ID*
This paper consists of 5 questions. **Answer Question One And Any Other Two Questions**
**Do not write on the question paper.**

### QUESTION ONE (30MKS) B

a.  Determine the equation of a straight line passing through point A( 2, 2) and B (1, 6) [3mks]

    I.    Evaluate $\lim_{x \to -3} \frac{x^2-9}{x+3}$                                     [4mks]

    II.    Determine the maximum value of y if $y = -0.01x^2 + 20x + 100$     [5mks]

b.  Find    the gradient to the curve y= $\frac{2x-4}{x+2}$    at x=0            [4mks]

c.  Find the equation of a normal to the curve $y = 2x^3 - 4x + 4$   at x=1     [6mks]

d.  find $g_0f$ given $g(x) = 2x - 2$ and $f(x) = 3x^2 + 2x + 2$ hence find $g_0f(1)$     [4mks]

e.  evaluate $\int_0^1 [6x^2 + 2]dx$     [4mks]

## QUESTION TWO [2OMKS]

a.  Find $f'(x)$ from first principles at $x = 2$ given $f(x) = 3x^2 + 2x$     [6mks]

b.  Evaluate $\frac{dy}{dx}$ at x=2 given $y = \frac{3x+4}{x+2}$ using quotient rule     [4mks]

c.  Evaluate $\int_1^3 [2x + 4]dx$     [4mks]

d.  Investigate the nature of turning points to the curve $y = x^3 - 12x + 6$     [6mks]

## QUESTION THREE [2OMKS]

a)  Evaluate $\int_2^4 [2x + 3x^2 + 3]dx$     [5mks]
b.  A straight line passes through A(3  2)  B(4 6) and C (1, y) find the value of y     [5mks]

c.  Determine inverse $(f^{-1}(x))$ of the function $f(x) = \frac{x}{2x+4}$     [5mks]

d.  determine the turning points of the curve $y = -2x^3 + 24x + 4$     [5mks]

## QUESTION FOUR (20MKS)

a.  Given $h(x) = x^2 + 2x + 2$ and g(x)= 2x +3 find  i] $goh$ (x) and hence evaluate $goh$ (2)  [5mks]

b.  Find the equation of a curve given that the gradient function of the curve, $\frac{dy}{dx} = 2x + 2$ and

the curve passes through (2 6)     [5mks]

c.  Use Simpson rule to evaluate $\int_1^3 [x^2 + 2]dx$     n=4     [6mks]

Determine the error in c)     [4mks]

## QUESTION FIVE [20MKS]

a) Find $\frac{dy}{dx}$ at x=1 given

      I] y= $(2x+4)^3$    using substitution              [5mks]

      II] $y = \frac{3x^2+2}{x+1}$       Using quotient rule           [5mks]

b) Evaluate I] $\int_0^2 [x-2]dx$                        [5mks]

      II] $\int_0^2 4x^{-2}dx$                        [5mks]