TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MATHEMATICS & PHYSICS

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN UPGRADING MATHEMATICS

AMA 1003: CALCULUS

SPECIAL/ SUPPLIMENTARY EXAMINATIONS

SERIES: SEPTEMBER 2018

TIME: 2HOURS

DATE: Pick Date September 2018

QUESTION ONE (30MKS)

a) Differentiate from first principles the function $f(x) = 2x^2 + 2x$ [6mks]

b) A straight line passes through (2, 6) is normal to a line $Y = -0.5x + 2$ find the equation of

the straight line [4mks]

c) Determine the inverse of the function f(x) given that $f(x) = \frac{4-2x}{x}$ 4mks]

d) What is the gradient and y-intercept of the line $3x = 12y - 4$ [4mks]

e) Determine the gradient of the curve $y = -0.5x^2 + 2x + 1$ at x=5 [4mks]

f) Determine the maximum value of y if $y = -0.02x^3 + 30x^2 + 20$ [7mks]

g) Evaluate   i) $\int_0^1 (2x+4)dx$ [3mks]

II) $\int_4^9 x^{0.5} dx$ [3mks]

QUESTION TWO

a. Differentiate from first principles the function $f(x) = 2x^3$ [6mks]

b. Given that the $q = x^3 - 0.5x^2 + 100$; determine the coordinates of the turning points [8mks]

c. Find $g_0 f$ given $f(x) = 2x + 1$ and $g(x) = 3x^2 + 2$ hence find $g_0 f(0)$ [6mks]

QUESTION THREE

a) Determine the value of x where the gradient of the curve $y = -12x - x^3 + 8$ is equal to -18

[4mks]

b) Use Simpson rule to estimate $\int_2^6 x^2 dx$ with n= 4 and hence determine the error in the

approximation [8mks]

c) Given that $h(x) = 2x + 4$, find $h_0 h(x)$ [4mks]

d) Determine the volume of a solid obtained when the curve $y = x^2$ is completely between

x=0 and x=2   [4mks]

QUESTION FOUR

a. Find the area under the curve $y = 3x^2$ between $x = -2 \ to \ x = 2$ and the x-axis by

    i.   Integration method   [6mks]

    ii.   Simpson rule with n=4   [8mks]

b. Determine the turning point to the curve $y = 0.01x^2 - 0.16x + 10$. Is point a minimal or maxima?   [6mks]

QUESTION FIVE

    a) Find the second derivatives of the following curves at $x = 0$

        i. $y = 3 + 2x^2 + 10x$ [3mks]

        ii. $y = 4x^3$ [2mks]

        iii. $y = 2x^{-1} + 3x + 4$ [5mks]

    b) Find the area under the curve $y = x$ between $x = -2$ and $x = 2$ and x-axis   [5mks]

    c) evaluate $\lim_{x \to 4} \left[\frac{x^2+2}{2} \right]$ [5mks]