



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF PURE AND APPLIED SCIENCES

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 $\lim_{x \rightarrow -3} \frac{x^2 - 9}{x + 3}$ [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 $g \circ f$ given $g(x) = 2x - 2$ and $f(x) = 3x^2 + 2x + 2$ hence find $g \circ f(1)$ [4mks]

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

QUESTION TWO [20MKS]

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 [20MKS]

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) $g \circ h(x)$ and hence evaluate $g \circ h(2)$ [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]