



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHS AND PHYSICS

UNIVERSITY EXAMINATION FOR: ANALYTICAL CHEMISTRY [YEAR1 SEM2]

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 5 questions. Answer Question One and Any Other Two Questions

Do not write on the question paper.

QUESTION ONE (30MKS)

- a. Find f' from first principles at $x = 2$ given $y = 3x^2 + 2x$ [5mks]
- b. Evaluate $\lim_{x \rightarrow -3} \frac{x^2 - 9}{x + 3}$ [4mks]
- c. Determine the maximum value of y if $y = -0.5x^2 + 10x + 10$ [5mks]
- d. Find the gradient to the curve $Y = \frac{2x - 4}{x + 2}$ at $x = 0$ use quotient rule [5mks]
- e. Find the equation of a normal to the curve $y = 2x^3 - 2x + 4$ at $x = 1$ [5mks]

- f. find $g \circ f$ given $g(x) = 2x - 2$ and $f(x) = 3x^2 + 2x + 2$ hence find $g \circ f(1)$ [6mks]

QUESTION TWO [20MKS]

- a. Evaluate $\frac{dy}{dx}$ at $x=2$ given $y = \frac{3x+4}{x+2}$ using quotient rule [5mks]
- b. Evaluate $\int_1^3 [2x + 4] dx$ [4mks]
- c. Investigate the nature of turning points to the curve $y = x^3 - 12x + 6$ [6mks]
- d. Determine the area under the curve $y = 2x + 2$ between $x=0$ and $x=3$ by integration [5mks]

QUESTION THREE [20MKS]

- a) Find the $\int_2^4 [2x + 3x^2 + 3] dx$ [5mks]
- e. A straight line passes through A(3 3) B(9 6) and C (x, 12) find the value of x [5mks]
- f. Determine inverse ($f^{-1}(x)$) given that $f(x) = \frac{x}{x-3}$ [5mks]
- g. 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) $g \circ f(x)$ and hence evaluate $g \circ f(2)$ [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 $\int_1^4 [x^2 + 2] dx$ [6mks]
- d. Given $f(x) = 2x + 4$ and $g(x) = 3x + 2$ find $g \circ f(1)$ [4mks]

QUESTION FIVE [20MKS]

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

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

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

b) Evaluate I] $\int_1^2 [x - 2] dx$ [5mks]

II] $\int_2^3 [x^2 + 2x] dx$ [5mks]