



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 YR1 SEM1

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)

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

$$y = x - 2 \quad [4\text{mks}]$$

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

c) What is the gradient and y-intercept of the following lines;

I. Evaluate $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4}$ [5mks]

II. Determine the equation of a straight line thro' $A(8, 2)$ and parallel to line $y = 0.5x + 3$ [5mks]

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

IV. Find the equation of a normal to the curve $y = 2x^3 - 24x + 4$ at $x=1$ [6mks]

QUESTION TWO

- Determine the equation of perpendicular to curve $y = 2x^2 + 2$ at $x = 1$ [6mks]
- find $g \circ f$ given $g(x) = 2x - 2$ and $f(x) = 3x^2 + 2x + 2$ hence find $g \circ f(1)$ [6mks]
- Given that the $p = x^3 - 9x^2 + 1000$; determine the minimum and maximum values of p [6mks]

QUESTION THREE

- Determine the value of x where the gradient of the curve $y = x^2 - 27x + 18$ is equal to 1 [4mks]
- Use Simpson rule to evaluate $\int_2^5 x^2 dx$ with $n = 6$ [6mks],
Hence show that the error is $\frac{1}{3}$ [4mks]
- Find the inverse of the function $h \circ h(x)$ given that $h(x) = 2x - 4$ [6mks]

QUESTION FOUR

- A straight line passes through A(1 2) B(4 6) and C (x, 4) find the value of x [5mks]
- Find the area under the curve $y = 3x^2$ between $x = 2$ to $x = 4$ [4mks]
- Find the values of x and y where the gradient of the curve $y = \frac{1}{3}x^3 - 7x$ is equal to 9 [5mks]
- Determine the maximum value of y if $y = 0.001x^2 - 0.8x + 10$ [6mks]

QUESTION FIVE

- Find the second derivatives of the following curves
 - $y = 3x^3 + 2x^2 + 10x$ [3mks]
 - $y = (x^2 + 1)^2$ [4mks]
 - $2y = 2x^2 + 3x + 4$ [3mks]
- Find the area under the curve $y = 2x + 3$ 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]