



(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
FIRST YEAR SECOND SEMESTER
MAIN EXAMINATION
FOR THE DIPLOMA IN EDUCATION
MATHEMATICS

COURSE CODE: EDM 104

COURSE TITLE: ANALYSIS AND CALCULUS I

DATE: 07/08/18

TIME: 9 AM -11 AM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 4 Printed Pages. Please Turn Over.

QUESTION ONE (30 MARKS)

- a. Find the value of x for which the expression $\frac{2x+5}{x^2-x-6}$ does not exist (2mks)
- b. Given a function $h(x) = x^2 - x$ find the value of $h(t + 1)$ (1mk)
- c. Given that $f(x) = 25 - x^2$ and that $g(x) = x$ find $g \circ f(13)$ (2mks)
- d. Find the range of the function $f(x) = x^2 + 1$ given that its domain is made of real numbers. (2mks)
- e. Find the inverse of the function
$$F(t) = \frac{5(t+7)}{3t-5}$$
 (3mks)
- f. Evaluate
$$\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$$
 (3mks)
- g. Find $y^1(x)$ if $y(x) = \frac{x^2 + x - 2}{x^3 + 6}$ (3mks)
- h. Find the linearization of the function $f(x) = \sqrt{x+3}$ at $a=1$ and use it to approximate the numbers $\sqrt{3.98}$ and $\sqrt{4.05}$ (4mks)
- i. Suppose that $f(0) = -3$ and $f^1(x) \leq 5$ for all values of x . How large can $f(2)$ possibly be? (3mks)
- j. Sketch the curve
 $Y = x^3 + x$ (3mks)
- k. Find the area of the region enclosed by the parabola $y = x^2$ and $y = 2x - x^2$ (4mks)

QUESTION TWO (15 MKS)

- a. A cylindrical can is to be made to hold 1 L of oil. Find the dimension that will minimize the cost of the metal to manufacture the can (8mks)
- b. Sketch the graph $f(x) = \frac{\cos x}{2 + \sin x}$ (7mks)

QUESTION THREE (15 MKS)

- a. What is a one sided limit? (1mk)
- b. Evaluate the following limits
- i. $\lim_{x \rightarrow 5} (2x^2 - 3x + 4)$ (3mks)
- ii. $\lim_{x \rightarrow 2} \frac{x^3 + 2x^2 - 1}{5 - 3x}$ (4mks)
- iii. $\lim_{t \rightarrow 0} \frac{\sqrt{t^2 + 9} - 3}{t^2}$ (3mks)
- iv. Use the concept of limits to find the derivative of the function $f(x) = \sqrt{x}$ (4mks)

QUESTION FOUR (15 MKS)

- a. If $g(x) = \int f(t) dt$, for $a < t < x$ where $a=1$ and $f(t) = t^2$ find a formula for $g(x)$ and calculate $g^1(x)$ (4mks)
- b. Find the derivative of the function $f(x) = \int \sqrt{1+t^2} dt$ for $0 < t < x$ (3mks)
- c. Find $\int \frac{x}{1-4x^2} dx$ (4mks)
- d. Evaluate $\int \frac{dx}{(3-5x)^2}$ for $1 < x < 2$ (4mks)

QUESTION FIVE (15MKS)

Differentiate the following functions

- i) $Y=(x^3 - 1)^{100}$ (3mks)
- ii) $Y = \frac{1}{\sqrt{(x^2+x+1)^{1/3}}}$ (3mks)
- iii) $g(t) = \left(\frac{t-2}{2t+1}\right)^9$ (3 mks)
- iv) $Y = (2x + 1)^5(x^3 - x + 1)^4$ (3mks)
- v) $Y = (1 + \cos^2x)^6$ (3mks)

END