



(Knowledge for Development)

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

COURSE CODE: EDM 105

COURSE TITLE: ANALYSIS AND CALCULUS II

DATE: 16/01/18

TIME: 2 PM - 4 PM

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 (28mks)

a) Given the point $(4, -3)$ and $(2, 7)$. Find the slope and the equation of the graph. (3mrks)

b) Write $y = 3x^2 - 12x + 1$ in the form $y = (x - h)^2 + k^2$. (2mrks)

c) Evaluate

$$\lim_{h \rightarrow 0} \frac{5}{\sqrt{5h+4}+2} \quad (2mrks)$$

d) Find the inverse of $g(t) = \frac{1}{t-5}$ hence evaluate $g^{-1}(x)$. (3mrks)

e) A car starts from rest and moves a distance (s) meters in t seconds were $s = \frac{1}{6}t^3 + \frac{1}{4}t^2$. What is the:

- i. Initial acceleration
- ii. Acceleration at the end of 2 seconds. (4mrks)

f) Differentiate :

- i. $y = \sqrt{1+x^2}$. (4mrks)
- ii. $y = \sin^2 x$ (3mrks)

g) Find the area enclosed by $y = 4x - x^2$ at $x = 1$ and $x = 2$ (4mrks)

h) Find $\frac{dy}{dx}$ for the function. $y^2 + x^2 + 25 = 0$. (3mrks)

QUESTION TWO (16mks)

a) Differentiate :

- i. $y = \frac{1}{1+\sqrt{x}}$ (6mrks)
- ii. $(x^2 + 3x)^7$ (5mrks)

b) The surface area of a sphere is $4\pi r^2$. r being the radius. Find the rate of change of the area in cm^2/s where $r = 2cm$. Given that the radius increases at the rate of $1cm/s$. (5mrks)

QUESTION THREE (16mks)

- a) Find the area enclosed between two curves

$$y = 4 - x^2 \text{ and } y = x^2 - 2x.$$

(8mrks)

- b) Evaluate:

i. $\int (\sqrt{x} + \sqrt[3]{x}) dx$

(3mrks)

ii. $\int x^2 \sin x dx$

(5mrks)

QUESTION FOUR (16mks)

- a) Given that :

$$F: x \rightarrow 10 = x$$

$$G: x \rightarrow x^3$$

$$H: x \rightarrow \frac{x}{2}$$

State down the functions:

i. FG

ii. GF

iii. FGH

iv. HGF

(4mrks)

- b) Given that
- $f(x) = 10x$
- and
- $g(x) = x + 3$
- . Find

i. $fg(x)$

(1mrks)

ii. $fg^{-1}(x)$

(2mrks)

iii. Verify that if $b = fg(a)$ then $fg^{-1}(a) = a$

(4mrks)

- c) Find the inverse of the following function

$$f(x) = 12 - \frac{1}{2}x. \text{ Hence calculate } f^{-1}(14).$$

(5mrks)

QUESTION FIVE (16mks)

- a) The velocity of a moving particle along a straight line is given by

$$V = \frac{1}{288}t(576 - t^2). \text{ Find the distance travelled in 24 seconds.}$$

(3mrks)

- b) A stone is thrown straight up with a velocity of
- $160ft/sec$
- .

It reaches a height of $s = 160t - 16t^2 ft$ after t sec.

i. How high does the stone go.

(3mrks)

ii. What are the velocity and speed of the stone when it is 256 feet above the ground?

(6mrks)

iii. What is the acceleration of the stone at any time.

(2mrks)

iv. When does the stone hit the ground again,

(2mrks)