KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2008/2009 ACADEMIC YEAR

BRIDGING CERTIFICATE COURSE IN MATHEMATICS

COURSE CODE: BMATH 003

COURSE TITLE: **BASIC CALCULUS**

STREAM: **BRIDGING**

DAY: **WEDNESDAY**

TIME: **8.30 – 10.30 A.M**

DATE: **10/12/2008**

INSTRUCTIONS TO CANDIDATES:

Attempt Question **ONE** and any **OTHER** two questions.

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

a)What do you understand by the following terminologies;

i) a critical number

ii)` a hole'

iii) a primitive function (6mks)

b) Given that; $f(x) = 2x^2-4x+2$ and $g(x) = x-1$, find:

i) (f+g) (x)

ii) (f · g) (x)

iii) $\left(\frac{f}{g}\right)(x)$

iv) f o g (x)

(8 marks)

c) Find the following limits if they exist:

i) $\lim_{x\to 3} \frac{x^2+7x+10}{x^2+4x+4}$ (2mks)

iii) $\lim_{x\to 4} \frac{\sqrt{x}-2}{x-4}$ (2marks)

d) Using the first principle method find dy/dx of the following functions

i) $y = 4x + 3$ (2mks)

ii) $f(x) = 5x^2-4x+11$ (3mks)

e)Verify the following limit

$\lim_{x\to 5} 4x+3=23$ (4mks)

f) find $\frac{dy}{dx}$ given $y=(x^2+4x+3)^{11}$ (3mks)

QUESTION TWO (20MARKS)

a) Find the $\frac{dy}{dx}$ of the following functions:

i) $y = 6x^4 + 3x^2 - 2x + 1$

ii) $y = (x^2 - 1)(4x - 1)^{10}$

iii) $y = \frac{x^2 - 6}{(x+2)^2}$

iv) $y = u^4$ and $u = 2x^2 - 1$ (8 marks)

b) Find the local extrema on the curve described by the equations below

i) $y = 2x^3 - 6x + 3$ (4marks)

ii) $y=5x^3-3x^5$ (4mks)

c) Differentiate $f(x)=xy^2 +x^3 +7$ (4mks)

QUESTION THREE (20MKS)

a) The distance, in meters, a particle moves in a given period of time (t) is given by:

$S(t) = 2t - 3t^2 - 2t^3$

i) Write an expression that gives the velocity of the particle at any time t. (2 marks)

ii) Write an expression that gives the acceleration of the particle at any time t. (2 marks

iii) What is the velocity and acceleration at t = 2 secs.? (2 marks)

b) Find the following integrals:

i) $\int (2x^2 + 2x - 1) dx$ (2mks)

ii) $\int_0^4 (2x + 1) dx$ (2 marks)

Then b) Find the derivatives of the following functions using the first principal technique .

i) $y = \frac{1}{x^2}$

ii) $y = \frac{1}{\sqrt{1+x}}$ (6 marks)

c) Find the tangent and normal equation to the curve $x^2 - y^2 = 7$ at a point (4,3). (4mrks)

QUESTION FOUR (20 MARKS)

a)What do you understand by the following terminologies;
(i)a function
ii) a real valued function (4mks)

b) Given that; $f(x) = 2x^2-4x+2$ and $g(x) = x-1$, find:

i) $(f+g)(x)$

ii) $(f \cdot g)(x)$

iii) $\left(\frac{f}{g}\right)(x)$

iv) $f \circ g(x)$

(4mks)

c) Find the following limits if they exist:

i) $\lim_{x \to 3} \frac{x^2+7x+10}{x^2+4x+4}$ (3mks)

iii) $\lim_{x \to 4} \frac{\sqrt{x}-2}{x-4}$ (3mks)

e)Verify the following limits

$\lim_{x \to 5} 4x+3=23$ (3mks)

f) Show that $x^2+5x+10=16$ (3mks)

QUESTION FIVE (20 MARKS)

a) Differentiate

i. $y = \dfrac{(2x^2 + 3x + 2)^2}{x + 3}$ (3 mks)

ii. $y = \sqrt{x^2 + 2x}$ (3 mks)

iii. $y = (x^2 + 3x + 4)(x + 6)^5$ (4 mks)

b) Using the definition of limits, verify the following limit:

x^2 +5x+10=16 (4 mks)

c) Let the function $y = 2x^3 + 2x + 4$, find the gradient of the curve at a point (1,6).

(2 mks):

e)Given the curve y=x^2-4, find the area under the curve bounded by the curve and x-axis.

(4 mks)