KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

FOR THE CERTIFICATE OF PRE – UNIVERSITY MATHEMATICS

COURSE CODE: BMATH 003

COURSE TITLE: BASIC CALCULUS

STREAM: BRIDGING

DAY: THURSDAY

TIME: 9.00 – 11.00 A.M.

DATE: 29/04/2010

INSTRUCTIONS:

Attempt **Question One** and any **other TWO** questions.

PLEASE TURN OVER

QUESTION ONE - COMPULSORY (30 MARKS)

a) Given $f(x)=x^2+2x+1$; evaluate f at the input values

i. 2 (2 mks)

ii. x+1 (3 mks)

iii. fff(0) (3 mks)

b) Let $f(x)=x^3+2x^2-4x$ and $g(x)=x-2$. Find:

i. 2f(x)+3g(x) (3 mks)

ii. f(x)g(x) (2 mks)

iii. $\frac{f(x)}{g(x)}$ (3 mks)

c) Using the first principle method differentiate the following functions:

i. y=4x+10 (3 mks)

ii. $y=2x^2+5x+3$ (3 mks)

iii. $y=\frac{1}{x^2}$ (3 mks)

iv. $y=6$ (3 mks)

d) Evaluate the following limit: $\lim_{x\to 0}\frac{x^2+x}{x}$ (2 mks)

QUESTION TWO (20 MARKS)

a) Define limit of a function (2 mks)

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

i. $\lim_{x\to 2} 5x-7=3$ (3 mks)

ii. $\lim_{x\to 3} 8-2x=2$ (3 mks)

c) Evaluate the following limits:

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

ii. $\lim_{x\to 2}\frac{(x-4)^3}{|4-x|}$ (3 mks)

d) Differentiate the following functions:

i. $y=\frac{(2x-5)}{(x^2+1)}$ (3 mks)

ii. $f(x) = x^2(5 + x^{-4})$ (3 mks)

QUESTION THREE (20 MARKS)

a) i. Find the equation of the line that passes through the point (5, 1) and whose slope is equal to ½. (3 mks)

ii. Given L being the line 4x+3y=6. Find the equation of the line L_2 perpendicular to L through Q(2,-3). (3 mks)

b) Integrate $\frac{dy}{dx} = 2x^3 + 3x^5$ (3 mks)

c) Find the equations of the tangent and normal to $y=x^3-2x^2+6$ at (1, 4) (4 mks)

d) Differentiate:

i. $y = \frac{(2x^2 + 3x)}{(x+1)^2}$ (4 mks)

ii. $x = \sqrt{y} - 10$ (2 mks)

iii. $y = 2x^{5/2} + x^{3/2} + 4$ (1 mk)

QUESTION FOUR (20 MARKS

a) An object moves along a line in such a way that its position at time t is:

$S(t)=t^3-6t^2+9t+5$

i. Find the velocity and acceleration of the object at time t at t=1 sec. and t=2 seconds. (5 mks)

ii. When is the object stationary? (3 mks)

b) Integrate the following function:

$\int_1^2 (2x^3 + x)dx$ (3 mks)

c) Given $y=2x^2-6x$

i. Find the critical points. (2 mks)

ii. Maximum and minimum values of y. (3 mks)

d) Differentiate and find gradient at the point given:

i. $f(x)=2x^2+x+6$ at point (1,2) (2 mks)

ii. $f(x)=x^3+x^2+x+5$ at point (2,4) (2 mks)

QUESTION FIVE (20 MARKS)

a) Differentiate

i. $y = \dfrac{(2x^2+1)^2}{x+1}$ (3 mks)

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

iii. $y = (2x^2+x+1)(x+1)^5$ (4 mks)

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

$\underset{x\to 0}{Lim}\, 3xSin\dfrac{1}{x} = 0$ (4 mks)

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

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

e) Differentiate

i. $y = \dfrac{(2x^2+1)^2}{x+1}$ (3 mks)

ii. $x^2 + xy^2 + y^2 + 4x + 6 = 0$ (5 mks)