KABARAK UNIVERSITY

(ELAND COLLEGE)

UNIVERSITY EXAMINATIONS

BRIDGING CERTIFICATE COURSE IN MATHEMATICS

AUGUST 2008 EXAMINATIONS

COURSE CODE: BMATH/003/011

COURSE TITLE: BASIC CALCULUS

STREAM: BRIDGING

DAY: WEDNESDAY

DATE: 27TH AUGUST 2008

TIME: 9.00 AM TO 11.00 AM

INSTRUCTIONS TO CANDIDATES

Attempt question ONE and any other TWO questions.

Question ONE (30mks)

a) Given that h(x) = x^2 - x, find the values of:

i) h(10)

ii) h(-3)

iii) h($\frac{1}{2}$)

iv) h(t + 1) (6mks)

b) If f(x) = $x^3 + 4x^2$ - 12x and g(x) = x – 2, find $\frac{f(x)}{g(x)}$ (2mks)

c) Calculate $\frac{x^2-25}{x-5}$ (3mks)

d) Use the first principle to find $\frac{dy}{dx}$ when y = x^2 – 4x. (3mks)

e) Calculate $\frac{dy}{dx}$ in the following:

i) y = $3x^2$ - 2x + 5 (2mks)

ii) y = 2x(1 -x^2) (2mks)

iii) y = $\frac{x^2+4}{x-3}$ (3mks)

f) Evaluate the following integrals:

i) $\int(x^2 + 6x - 4)dx$ (2mks)

ii) $\int_1^2(5x - x^2)dx$ (3mks)

g) Find the equation of the tangent to the curve.

Y = $2x^3$ - x^2 + 4x – 1 at x = -2 (4mks)

Question 2 (20mks)

a) If f(x) = ax + $\frac{b}{x}$ and if f(2) = 9 and f(3) = 16, evaluate a,b and find the values of x for which f(x)= 0 (3mks)

b) Find the derivative ($\frac{dy}{dx}$) of the function y = $2x^2$ + 2 from the first principles. (3mks)

c) Find the value of the gradient of y = x^4 - $3x^2$ + 4x + 1 when x = 1 (2mks)

d) A particle starts from rest and moves a distance of 5 metres in t seconds, where S = $\frac{1}{6}t^3 + \frac{1}{4}t^2$. What is its acceleration when t = 2 (2mks)

e) The gradient of a curve at any point (x, y) is 7 – 2x. given that the curve passes through (3,2), Find:

i) the equation of the curve.(4mks)

ii) the points where the curve crosses the x-axis. (4mks)

iii) The point where the gradient is zero. (2mks)

Question 3 (20mks)

a) Find the equations of the tangent and normal to the curve.

y = x^3 - $2x^2$ - 2x – 3 at x = 2 (10mks)

b) A particle moves in a straight line and its distance is 5 metres from a point given by:

S = 45t + $11t^2$ - t^3

i) find an expression for the velocity v in terms of t

ii) find an expression for the acceleration in terms of t

iii) find both the velocity and acceleration when t = 3 seconds.

iv) prove that the particle will come to rest after 9 seconds.

(10mks)

Question 4 (20mks)

a) Find $\frac{dy}{dx}$ given that:

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

ii) y =(x^2 + 2) (x^3 - 3) (2mks)

b) Use the second derivative to determine whether the function has a minimum or maximum. $y=x^3-6x^2+9x+2$ (3mks)

c) Calculate the area between the curve y = 3x - x^2 and the x-axis from the point x = 0 to x = 5. (5mks)

d) Simplify $\frac{x^7+4x^3-3x}{x^2+2x}$ (3mks)

e) Find the equation of a line, perpendicular to the line 2y = 3x – 5 and passing through (2, 7) leaving your answer in the form ax + by + c = 0 where a, b, c are constants. (3mks)

f) The domain of the function f(x) is $\{1, 2, 3, 4, 5\}$. Find the range if

f(x) =$5x^2$ + 3 (2mks)

Question 5 (20mks)

a) Arrange the equation 3x + y + 6 =0 in the form y = mx + c, hence write down the gradient and y-intercept. (3mks)

b) Given that f(x) = 10x and g(x) = x + 3 find fg(x) and hence the value of fg(2) (3mks)

c) i) Use the trapezium rule to find the area between the curve y =x^2 + 4, the x-axis and the co-ordinates x = 0 and x = 4. Take values of x at intervals of $\frac{1}{2}$ units. (5mks)

ii) Use integration to find the exact area in c) (i) above. (3mks)

d) The gradient function of a curve is given by

$\frac{dy}{dx}$ = $3x^2$ - 8x + 2. If the curve passes through point (0, 2), find its equation. (4mks)

e) Find the equation of the tangent to the curve. y = x^2 at the point (5, 25) (2mks)