

BABCOCK UNIVERSITY, ILISHAN – REMO, OGUN STATE

DEPARTMENT OF BASIC SCIENCES

1ST SEMESTER EXAMINATION, 2013/2014 SESSION

MATH 102, GENERAL MATHEMATICS II

TOTAL MARKS: 60 TIME ALLOWED: 2 Hours

INSTRUCTION: ATTEMPT ANY FOUR (4) QUESTIONS.

Question 1

- Define a function. (3 marks)
- Hence state and sketch four (4) types of functions. (4 marks)
- Evaluate (i) $\lim_{x \rightarrow 3} \frac{x^3 - 27}{x - 3}$ (4 marks). (ii) Is the function $f(x) = \frac{x^2 - 4x - 21}{x - 7}$ defined on $f(7)$? (4 marks)

Question 2

- (i) Hence State the three conditions for the continuity of a function at a point $x = a$. (3 marks). (ii) Evaluate $\lim_{x \rightarrow 0} \frac{1 + \frac{1}{x}}{1 - \frac{1}{x}}$. (4 $\frac{1}{2}$ marks)
- (i) Discuss the continuity of $f(x) = \frac{x^2 - 4x + 3}{x - 3}$ at $x = 3$. (5 marks)
- (ii) Is the function f define by $f(x) = \frac{3x^2 + 5}{x - 1}$ continuous at $x = 1$? (2 $\frac{1}{2}$ marks)

Question 3

- Find from first principle the differential coefficient of $f(x) = \frac{2x+3}{x+1}$ with respect to x . (6 marks).
- Differentiate the following functions w.r.t. x (i) $y = \frac{x}{x^2+1}$, (ii) $y = (x^3 + 5)^6$, (iii) $y = (x^2 - 5x)(2x^2 + 7)$ (9 marks)

Question 4

- (i) Find the gradient of $x^2y = 2x + 3y$ at the point $(2, -1)$. (5 marks)
- (ii) If $y = a \sin x + b \cos x$, show that $\frac{d^2y}{dx^2} + y = 0$. (2 $\frac{1}{2}$ marks)
- (i) State L'hipital's Rule (1 $\frac{1}{2}$ marks). Hence determine $\lim_{x \rightarrow 0} \frac{\sin^2 x}{1 - \cos x}$ (3 marks)
- (ii) If $5y = x^2 - y^2 + 3x$, find $\frac{dy}{dx}$. (3 marks)