

BABCOCK UNIVERSITY

SCHOOL OF BASIC AND APPLIED SCIENCES

DEPARTMENT OF BASIC SCIENCES

COURSE CODE: MATH101

COURSE TITLE: GENERAL MATHEMATICS 1

TIME ALLOWED: 2HRS

TOTAL MARKS: 60

DATE: 12/12/2013

LECTURERS: Adeladun, J.F; AdioA. K; Kanu, R.U; Ayinde, S.A.

ATTEMPT FOUR QUESTIONS ONLY

QUESTION ONE

- (a) Let A and B be any non-empty arbitrary sets.

Define :

(i) $A \cap B$ (ii) $A \cup B$ (2marks)

Show that (iii) $A \cap B = B \cap A$ (iv) $A \cup B = B \cup A$ (3 marks)

- (b) (i) Define cardinality of a set A. (1 mark)

(ii) If A and B are arbitrary non-empty finite sets, show that

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$ (4marks)

- (c) (i) Let A be a non-empty subset of a universal set μ . Define the notion, complement of A. (2 marks)

(ii) Hence, if $\mu = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$ and $A = \{1, 3, 5, 7, 9, 11, 13\}$,

Show that $(A')' = A$ and $A \cup A' = \mu$. (3 marks)

QUESTION TWO

- (a) (i) State the principle of mathematical induction. (2 ½ marks)

- (ii) Prove by mathematical induction that $9^n - 1$ is a multiple of 8 for all positive integral powers of n. $8(9P+1)$ (5 marks)

- (b) Show by induction that

$$\sum_{r=1}^n \frac{1}{r(r+1)} = \frac{n}{n+1} \quad \frac{k+1}{k+2}$$

is true for all positive integers n.

(7 ½ marks)