CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN

MATH 0121: INTRODUCTORY MATHEMATICS

STREAMS: DIP. **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 16/12/2020 **8.30 A.M. – 10.30 A.M.**

INSTRUCTIONS:

- **Answer all questions in section A and any other two in section B.**

SECTION A

QUESTION ONE (30 MARKS)

(a) Given $f(x) = 3x^2 + 2x + 3$, $g(x) = 2x^2 + 4x^2 - 2x + 1$
Find $f(x).g(x)$ (5 marks)

(b) If $A = 3,8,12,16$ and $B = 12,14,18$. Find $A \cup B$ and $A \cap B$. (3 marks)

(c) Use the Pascal's triangle to write out the expansion of $(x + y)^4$. (4 marks)

(d) A GP has first term 3 and common ratio 2. Find the sum of the first 10 terms. (4 marks)

(e) Show that $\frac{\tan\theta}{\sin\theta} = \sec\theta$ (3 marks)

(f) Given $Z_1 = 6 - 9i, Z_2 = -4 + 7i$.

Find (i) $\frac{Z_1}{Z_2}$ (ii) $\frac{\bar{Z}_1}{Z_1}$ (7 marks)

(g) Draw a truth table to show that $P \rightarrow Q$. (4 marks)

SECTION B

2. (a) In how many ways can 4 boys and 2 girls be seated in rows where

(i) The boys and girls can seat anywhere.

(ii) The two girls must seat together.

(iii) The two girls must be separated.

(b) Construct a truth table to show that (5 marks)

$\sim P\ V \sim Q = \sim(P \Lambda Q)$

(c) Evaluate the following piecewise function.

Given $f(x) = \begin{bmatrix} 2x+5 & if\ x \leq 3 \\ x^2+1 & if\ 3 < x \leq 5 \\ 4x-6 & if x > 5 \end{bmatrix}$

Find $f(1), f(5) and\ f(10)$. (5 marks)

(d) Draw a Venn diagram to show that the two sets are disjoint
$A = (1,3,7,5) and\ B = (2,6,4,9)$ (2marks)

3. (a) Find the expansion of $(2x-3y)^5$ (5 marks)

(b) Given $Z_1 = -4-3i\ and\ Z_2 = 3+2i$

Find $|Z_1 Z_2|$ (7 marks)

(c) An AP has third term= 3 and fifth term=9. Find the first term and the common difference. (8 marks)

4. (a) Show that $A \cap B = B \cap A$ (5 marks)

(b) Plot a graph of $y = \sin\theta$ for $0^0 \leq \theta \leq 360^0$. (6 marks)

(c) Given $f(x) = 2x+1, g(x) = x+1. Find\ fog\ (-3)$. (5 marks)

(d) Write out the following series in full and evaluate it. $\sum_{i=1}^{5}(2i+5)$ (4 marks)
