MATH 0121

CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

SECOND YEAR SECOND SEMESTER EXAMINATION FOR THE AWARD OF DIPLOMA IN ECOTOURISM

MATH 0121: INTRODUCTORY MATHEMATICS

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

DAY/DATE: FRIDAY 09/7/2021   **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 $f(x) = 3x^2 + 2x + 3,$ $g(x) = x^3 + 8x^2 - 3x + 1$

Find $f(x).g(x)$.   (4 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)   Find θ in the following equation $2tan\theta^2 - tan\theta - 1 = 0.$ (4 marks)

(f)   State the properties of real numbers in the equations below.

   i. $3(4 + 5) = 12 + 15$

   ii. $8 + 9 = 9 + 8$

   iii. $5 = 5 + 0$

   iv. $7 \times 1 = 7$ (4 marks)

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

(h)   A school committee of 9 members is to be chosen from 8 parents and six teachers and the

principal. How many ways can the committee be formed in order to include the:

i) The principal

ii) The principal and five parents.   (3 marks)

SECTION B

QUESTION TWO (20 MARKS)

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

b) Draw a truth table to show that $\sim P \ V \sim Q = \sim(P \wedge Q)$. (8 marks)

c) Evaluate the following piecewise function.

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

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 $B = (2,6,4,9)$. (2 marks)

QUESTION THREE (20 MARKS)

(a) Find the expansion of $(3x - 7y)^5$. (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 term3 and fifth term 9. Find the first term and the common difference hence evaluate the sum of the first 10 terms. (8 marks)

QUESTION FOUR (20 MARKS)

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. (5 marks)

(b) Plot a graph of $y = cos\theta$ for $0° \le \theta \le 360°$ at an interval of $30°$. (3 marks)

(c) Given $f(x) = 8x + 1, g(x) = 4x + 1$. Find $fog(-3)$. (5 marks)

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

(e) In how many ways can the letters in the word MATHEMATICS be arranged in order for the vowels to come together? (3 marks)