CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN BRIDGING

MATH 0121: INTRODUCTORY MATHEMATICS

STREAMS: DIP IN BRIDGING   **TIME: 2 HOURS**

DAY/DATE: THURSDAY 7/12/2017   **2.30 P.M - 4.30 P.M.**

INSTRUCTIONS:
- **Answer Question ONE (Compulsory) and any other TWO**

QUESTION ONE [30 MARKS]
(a) Distinguish between a simple and a compound statement. [2 Marks]

(b) Define the following type of numbers. Give an example in each case.
   (i) Integers
   (ii) Rational
   (iii) Irrational
   (iv) Complex [4 Marks]

(c) Given $f(x) = x + \frac{3}{x}$, evaluate
   (i) $f(-3)$
   (ii) $f(2)$
   (iii) $f(1) - f(3)$
   (iv) $f(x^2)$ [4 Marks]

(d) In a class of 42 students, 30 of them take Mathematics and 25 take Chemistry. How many students take both subjects? Represent your answer on a venn diagram. [5 Marks]

(e) Expand $(x + y)^4$ [3 Marks]

(f) How many arrangements are there of the letter of the word SUCCESS? [4 Marks]

(g) Given $\cup = \{0, 3, 6, 9, 10, 12, 13\}$
$\quad\quad A = \{0, 3, 10\}$
$\quad\quad B = \{3, 10, 12\}$

Find   (i) $A \cap B$
      (ii) $A \cup B$
      (iii) $A^c \cup B^c$
      (iv) $A^c \cap B^c$
      (v) $(A \cup B) \cap A^c$ [5 Marks]

(h) Given $f(x) = 3x - 5$
$\quad\quad g(x) = 3 - 2x$

   Evaluate
      (i) $f(x) + g(x)$
      (ii) fog (2)   [3 Marks]

QUESTION TWO
(a) Prove $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ [5 Mark]
(b) Given $f(x) = 6x - 2$
$\quad\quad g(x) = 2x + 4$

   Evaluate
      (i) $f + g(-1)$ [2 Marks]
      (ii) $f(2x) - 4g(x)$ [4 Marks]
      (iii) fog (x)   [3 Marks]
      (iv) gof (x)   [3 Marks]

(c) Classify the following numbers
      (i) 2
      (ii) -1
      (iii) $\sqrt{-3}$ [3 Marks]

QUESTION THREE
(a) A committee of 9 members is to be formed from 8 parents and 6 teachers and the principal. How many ways can the committee be formed in order to include;
      (i) The principal
      (ii) The principal and 5 parents   [10 Marks]

(b) Construct a truth table to verify if the statements $\sim p \vee \sim q$ and $\sim p(\wedge q)$ are equivalent.
                                                                [5 Marks]

(c) Find the value of K such that the sequence is an AP
$\quad\quad K - 1, \; K + 3, \; 3K - 1$ [5 Marks]

QUESTION FOUR

(a) In an AP of 25 terms, 4th term is 4, 22nd term is 5, find the sum of the AP. [5 Marks]

(b) Given that

$$g(x) = \begin{cases} x+5 & \text{if } x \leq -3 \\ -1 & \text{if } -3 < x \leq 0 \\ 2-x & \text{if } x > 0 \end{cases}$$

Find

    (i) $g(-1)$
    (ii) $g(-4)$
    (iii) $g(2)$
    (iv) $g(0)$
    (v) $g(10)$ [5 Marks]

(c) Show that $\dfrac{1+\cos\theta}{\sin\theta} = \dfrac{\sin\theta}{1-\cos\theta}$ [5 Marks]

(d) Solve for n in $n_{C2} = 28$ [5 Marks]

QUESTION FIVE

(a) Peter has five friends. In how many ways can he invite at least 3 of his friends to his birthday party? [4 Marks]

(b) How many terms at least of the AP 1, 4, 7, 10… Are needed to give a sum greater than 590 from the first term of the AP. [3 Marks]

(c) Solve $6\sin\theta + \dfrac{1}{\sin\theta} = 5$ [5 Marks]

(d) Given $f(x) = 2x^2 + 1$
        $g(x) = x + 3,$ find

    (i) $fog(x)$
    (ii) $fof(x)$
    (iii) $gog(x)$ [6 Marks]

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