ADDIS ABABA UNIVERSITY
COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES
DEPARTMENT OF MATHEMATICS
Mathematics for Natural Sciences (Math 1011)
Mid-Term Examination - December 19, 2019

Name _____ ID. No. _____

Select Campus (AAiT, CHS, CNCS, EiABC) Section _____ Time allowed: $2\frac{1}{2}$ Hours

Instructions: This examination has 10 short answer questions and 5 workout problems. Attempt each question on the space provided for each question. Using **Calculators** and **Mobiles** are strictly forbidden.

For Instructor's use only:

PART I	PART II	TOTAL

Part I: (Short Answer) *Give the most simplified answers on the space provided.*

(1) Let p and q be propositions. If $p \Rightarrow q$ is False, then the truth value of $((\neg p) \wedge q) \Leftrightarrow (p \vee q)$ is _____.

(2) If $\frac{x+yi}{i} = 7+9i$, where x and y are real numbers, then the value of $(x+yi)(x-yi)$ is equal to _____.

(3) Let the set $S = \{x \in \mathbb{R} : |x-2| < 3\}$. Then the $lub(S)$= _____ and $glb(S)$= _____.

(4) The simplified form of the set $(2,4]^c \cap ((-\infty, 5) \cap [0, \infty))$ as an interval or union of intervals is equal to _____.

(5) Let the set $B = \{y : y \in \mathbb{N} \text{ and } 1 \leq y \leq \sqrt{5}\}$. Then the power set of B, $P(B)$ is equal to _____.

(6) The smallest positive integer m for which $(\frac{1+i}{1-i})^m = 1$ is equal to _____.

(7) Let $GCF(x, 400) = 20$ and $LCM(x, 400) = 1200$. Then the value of x is equal to_____.

(8) Determine the truth value of the following propositions
(a) $(\exists x \in \mathbb{R})(\exists y \in \mathbb{R})[|x| + y = 0]$ is _____.

(3) Find the three cube roots of the complex number $z = -8i$. [4 Pts.]

(4) Without using truth table, show that $(q \wedge (\neg q \vee p)) \vee (p \wedge \neg(q \wedge p)) \equiv p$ for any propositions p and q. [4 Pts.]

(5) Determine the validity of the argument: [4 Pts.]
If there was a great run, then traveling was difficult.
If they arrived on time, then traveling was not difficult.
They arrived on time.
Therefore, there was no great run.