(10)

(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

2017/2018 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER

SPECIAL/ SUPPLEMENTARY EXAMINATION

FOR THE DIPLOMA IN EDUCATION

MATHEMATICS

COURSE CODE: EDM 101

COURSE TITLE: NUMBER SYSTEMS

DATE: 17/10/18 **TIME:** 3 PM – 5 PM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

QUESTION ONE (28 MARKS)

a) Define the following terms: (10 marks)

i. Sets

ii. Disjoint sets

iii. Equal sets

iv. Universal set

v. Singleton set

b) Use venn diagrams to illustrate the following sets (8 marks)

i. $(A \cup B)^C$

ii. $A\Delta B$

iii. $A \cap B \cap C$

iv. $A - (B \cap C)$

c) Using truth tables, show that $A \vee (B \wedge C) \equiv (A \vee B) \wedge (A \vee C)$ (10 marks)

QUESTION TWO (16 MARKS)

a) Define the following operations on natural numbers (6 marks)

i. Commutativity

ii. Assocativity

iii. Distributivity

b) Evaluate the following

i. $\{\mathbb{Z}\} \cup \{\mathbb{N}\}$

ii. $\{\mathbb{Z}\} \cap \{\mathbb{Q}\}$

iii. $\{\mathbb{Q}\} \cap \{irrationals\}$

iv. $\{\mathbb{R}\} \cup \{\mathbb{Z}\}$

v. $\{\mathbb{R}\} \cap \{\mathbb{Z}\}$ (10 marks)

QUESTION THREE (16 MARKS)

a) Determine the truth tables of the following propositions and state if they are tautologies or contradictions

i. $(C \vee D) \Leftrightarrow \sim (\sim C \wedge \sim D)$

ii. $\sim (A \vee \sim A)$ (10 marks)

b) Let $z1 = -4 + 6i$ *and* $z2 = 3 - 5i$. Find: (6 marks)

i. $z + x$

ii. $z - x$

iii. $z \times x$

QUESTION FOUR (16 MARKS)

a) Let $U = \{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15\}$. further, let $A = \{2,4,7,8,9,12,14\}; B = \{1,3,5,7,9,11,13,15\}$ *and* $C = \{9,10,11,12,13,14,25\}$ be subsets of U. Find:

i. A^C

ii. B^C

iii. C^C

iv. A-C

v. $(A \Delta B)$

vi. $B^C \cup A^C$ (12 marks)

b) Define the following operations on sets

i. Union

ii. Intersection

iii. Complement

iv. Difference (4 marks)

QUESTION FIVE (16 MARKS)

a) Express the following complex numbers in the $x + yi$ form.

i. $(9 + 2i) + (3 - 2i)$

ii. $(4 - 3i) - (3 - 8i)$

iii. $(7 - 3i)^3$

iv. $\frac{3+5i}{4-3i}$ (8 marks)

b) Let $z = -2 + 6i$ *and* $X = 4 - 5i$. Find: (8 marks)

iv. $z + x$

v. $z - x$

vi. $z \times x$

vii. z/x