



TECHNICAL UNIVERISTY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATIONS FOR DEGREE IN:
BACHELOR OF TECHNOLOGY IN INFORAMATION TECHNOLOGY (Y1)

EIT 4110: DISCRETE STRUCTURES

END OF SEMESTER EXAMINATION

SERIES: APRIL 2015

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- Answer Booklet

This paper consists of **FIVE** questions.

Attempt question **ONE (Compulsory)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One (Compulsory)

a) State the meanings of het following symbols:

\exists
(i)
(ii) \forall

ϕ
(iii) marks) (6

b) Using examples, show the meaning of the following words as used in set theory:

(i) Singleton
(ii) Doubleton
(iii) Tripleton
marks) (6

c) Write the English meaning of the following expression:

$(x \in \{x; x \text{ is tal}\} \leftrightarrow x \text{ is tall})$
 \forall_x (6 marks)

d) Use a Venn diagram to represent the relationship

$$A \cap B$$

(6 marks)

e) Let $U = \{1,2,3,4,5\}$ Let $S \subseteq U$ be $\{4,5\}$ Determine S^c

(6 marks)

Question Two

a) Which of the following are sets? Assume that a proper universal set has been chosen:

$$A = \{2,3,5,7,11,13,19\}$$

(i)

$$B = \{A, E, I, O, U\}$$

(ii)

$$C = \{\sqrt{x} : x < \phi\}$$

(iii)

$$D = \{1,2, A, B, Q,1, V\}$$

(iv)

(v) E is a list of all people in your phone book

(10 marks)

b) Give Venn diagram representation for the following sets:

(i) $A - B$

(ii) $B - A$

$$A^c \cap B$$

(iii)

$$A \Delta B$$

(iv)

$$(A \Delta B)^c$$

(v)

(10 marks)

Question Three

a) Suppose $f : N \rightarrow N$ is given by:
 $f(n) = 2n$

while of $g : N \rightarrow N$ is given by:
 $g(n) = n + 4$

Determine:

(i) $(g \circ f)(n)$

(4 marks)

(ii) $(f \circ g)(n)$

(4 marks)

b) Determine a, b, c, d in the following truth table

X	Y	X or Y
0	0	a
0	1	b

1	0	c
1	1	d

c) Determine a and b in the following table

(4 marks)

X	Not X
0	a
1	b

Question Four

a) Fill in the blanks

a	b	c	$b*c$	$a+(b*c)$	$a + b$	$(a + b)^*$	$(a + b)^* (a + c)$
0	0	0					
0	0	1					
0	1	0					
1	1	1					
1	0	0					
1	0	1					
1	1	0					
1	1	1					

(20 marks)

Question Five

a) Use the properties of Boolean Algebra to prove that:

$$(a + b) (a + a) = a$$

(5 marks)

b) Convert the following equation to logic gates:

$$F = a \text{ AND NOT } (b \text{ OR NOT } (c))$$

(15 marks)